VOLUME 51
No. 2

WHOLE NO. 228
1939

Psychological Monographs

EDITED BY
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Time-Sampling Studies of Child Behavior

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PUBLISHED BY
THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.
PUBLICATIONS OFFICE
THE OHIO STATE UNIVERSITY, COLUMBUS, OHIO

PREFACE

Considerable attention has been devoted in recent years, particularly in the child behavior field, to the refinement of methods of observing behavior in life situations. The most extensive and persistent attack upon this problem was a program of methodological research directed by Professor Dorothy Swaine Thomas at the Child Development Institute of Teachers College, Columbia University, in 1927–30 and at the Institute of Human Relations, Yale University, in 1930–36. This program included, as one unit, studies of the spontaneous reactions of young children to the social and material stimuli afforded by the free play period in the nursery school and the work period in public-school kindergartens and first grades. The method used in these researches is commonly called "time sampling" since its function is to sample the behavior of an individual or group in short-time periods in a given situation in such a way as to yield representative measures of the most usual or most characteristic behavior of the individual or group under the conditions obtaining in the chosen situation. The purpose of this monograph is to describe and evaluate these child behavior studies, to relate them to other similar investigations and to appraise the time-sampling method of controlled observation at its present stage of development.

The basic aim of these exploratory researches was to develop significant indices of the normal behavior of individuals and groups which would be legitimately comparable one with another, irrespective of the observer, the situation or the individual observed and which would be more reliable than selective judgments based on random observation. Their purpose was to describe rather than to explain observed behavior. As a first step toward the ultimate isolation of factors associated with particular modes of behavior, it seemed important to define individual patterns in terms of the degree to which specific forms of behavior were displayed under given conditions, to determine

the stability of the patterns under those conditions and to relate the pattern of each individual to those of others exposed to the same physical environment. It should then be possible, by applying the same procedure to other situations, to determine whether the observed pattern was generally characteristic of the individual in all or most situations or was induced by a particular combination of circumstances and whether it persisted at later stages of development. Studies of this sort should lead, eventually, to discovery of environmental and individual concomitants or determinants of particular patterns. If, for example, two groups, one of highly social and one of definitely nonsocial children could be distinguished at a given age level by means of comparable objective measures of sociability and if these children could be observed at successive growth stages in situations affording equivalent degrees of social freedom, it should be possible to begin to segregate some of the elements involved in the formation of the social and the asocial patterns and at the same time to check the accuracy of predictions based on the original observations.

Previous reports of this program of observational studies of social behavior have stressed problems related to the reliability of observers and techniques. The material included in the present volume is organized in terms of (a) an evaluation of the recording technique used, as discriminative of individual and group differences, and (b) an analysis of the dependability of the behavior samples and of the factors affecting the sampling of behavior in " free " situations. Part I of the monograph is concerned with the background, development, assumptions and present status of the time-sampling method in the child behavior field. Part II presents the results of a five-year program of time-sampling studies of young children. The purpose and scope of the program are discussed in Chapter II. The following three chapters contain analyses of the behavior records from the standpoint of age and sex differences in the frequency and distribution of social contacts, of individual and group patterns of social contact and work behavior and of the constancy of the social patterns as indicated by the results of repeated observations of

24 children. Chapters VI and VII are concerned with an evaluation of the behavior samples from the standpoint of the reliability of the original records and the representativeness of the behavior samples. The concluding chapter contains a general summary of the program.

Many individuals have contributed to the successful completion of this program. I am especially indebted to the immediate sponsors of the investigation—to Professor Mark A. May, Director of the Institute of Human Relations, for facilitating access to the New Haven schools, for helpful suggestions at various points and for criticism of the manuscript, and to Professor Thomas, for the hypothesis and the conceptual background of the research, for constant guidance and constructive criticism and, above all, for the scientific ideal which her own work represents. To Professor Edwin B. Wilson of the Harvard University School of Public Health, who contributed much time and the wisdom of his broad experience to exploration of the sampling problems, I am deeply indebted for invaluable assistance in the statistical treatment of the data.

The generous cooperation of the following individuals associated with the New Haven public schools is acknowledged with grateful appreciation: Bessie L. Gambrill, Associate Professor of Elementary Education, Yale University, Norma E. Cutts, Supervisor of Special Education, Genevieve M. Leary, Director of Training Schools, New Haven State Normal School, the late John C. McCarthy, Superintendent of Schools; Frances H. Furbish, Albert J. Harder, Elton E. Knight and Anna S. Planten, school principals; and Jane H. Curran, Mollie Dolan, Isabel M. Flanigan, Lydia S. Harris, Anna C. Hintz, Ola N. Hulen, Katherine G. James, Alice H. Kaaz, Mary K. Logan, Anna E. McManus, Iva A. Mercer, Julia L. Smith and Anna M. Welch, classroom teachers.

The indispensable assistance of Eleanor C. Isbell, both in the collection and in the analysis of the data over a period of four years, is also acknowledged with special appreciation.

R. E. A.

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IIA. Speech to Children.

IIIA. Physical Contact with Children.

IVA. Number of Children Addressed.

VA. Speech to Adults.

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PART I

INTRODUCTION

CHAPTER I

THE TIME-SAMPLING METHOD OF CONTROLLED OBSERVATION

The observational studies of nursery-school, kindergarten and first-grade children reported in this monograph represent successive stages in a continuous integrated program of research covering a five-year period. Motivated as they were by objectives formulated in 1929, they can be properly evaluated only when oriented in their appropriate historical setting. It is the purpose of this introductory chapter, therefore, to review briefly the dominant aims and emphases of research in child behavior at the time the intitial study of the series was undertaken, and to describe the development and current status of the time-sampling method of controlled observation which enjoyed a considerable popularity in child studies during the past decade and is exemplified, in a highly refined form, in the observational technique here described. Time sampling, in the restricted sense in which the term will be used in this discussion, is defined as a method of sampling the behavior of an individual or group in which the occurrence of specific overt acts—or a classification of such acts according to predetermined definitions—is recorded in a series of time periods of uniform length in such a way as to yield quantitative measures descriptive of the characteristic frequency or variability of the behavior for that individual or group under the conditions of observation.

Background

In 1920, the National Research Council appointed a Committee on Child Development with the purpose of encouraging research in the field of child behavior.[1] During the ensuing period of approximately fifteen years, with the aid of substantial grants from the Laura Spelman Rockefeller Memorial and the General

[1] Four conferences of this committee were held between 1925 and 1933 and a full-time director was maintained during the period 1926–29.

Education Board, child welfare research institutes, nursery schools and clinics were established, post-graduate scholarships and post-doctoral fellowships were offered to qualified students,[2] and elaborate research programs were undertaken. During the early stages of this child development movement, attention was centered on the preschool period. Evidence of the widespread interest in the preschool child at this time is found in the fact that the National Society for the Study of Education devoted its 28th Yearbook, published in 1929, to the subject of preschool and parental education (49).[3] Previous to the establishment of nursery schools and organized play groups, the very young child had been inaccessible to research. Knowledge of normal development in the early years had been largely confined to biographical records of a few highly selected children made by parents or other interested observers. To determine the extent to which the findings reported in these studies were applicable to the general population of preschool children, comparable observations of large numbers of children under carefully controlled conditions were needed. A further impetus to study of the young child was contributed by psychiatrists, psychoanalysts, and others concerned with the treatment of the behavior deviate who stressed the importance of early experiences in shaping the course of development in later years and the need for early detection of undesirable behavior patterns to the end that gross behavior disorders might, if possible, be prevented.

The research of this period was predominantly concerned with the scientific study of normal and deviate patterns of behavior, with preliminary attempts to define behavior norms and with the development of reliable indices of individual growth and adjustment, at successive age levels and under varying conditions.[4] The emphasis on norms in studies of social and emo-

[2] One hundred and sixteen post-graduate scholars and 14 post-doctoral fellows were appointed to work in this field.

[3] Figures in parentheses indicate bibliographical references at the end of the volume.

[4] A less common type of research dealt with practical problems of educational procedure. Children's use of play and work materials, to cite one example, was systematically studied to determine what kinds of materials are best suited to the needs of children at different ages.

tional behavior is attributable, in part, to the considerable degree of success already achieved in defining norms of physical and mental development; in part, to exposure of the fallacy involved in assuming a relationship between a behavior pattern and a specific characteristic of the person manifesting the pattern without first determining the prevalence of the behavior in large populations of individuals not possessing the given characteristic.[5] It was important, in other words, to find out what constitutes normal behavior for most children of a given age, nationality, socio-economic group, culture, etc., before inferring causal relationships between the observed pattern of an individual and any of these factors.

In studying the young child, the logical method was direct observation, either in controlled or in uncontrolled environments. The child's immaturity precluded recourse to methods dependent on introspection and verbal reports of feelings, ideas or experiences. Furthermore, the behavioristic trend in psychological research at this time favored an objective approach to child study.[6] But the early attempts to study child behavior on an extensive scale by the traditional observational method—the diary record or behavior log—proved unsatisfactory. Records of this sort were inevitably selective, dependent on the momentary judgment of the recorder, and afforded no uniform basis for comparison of one individual with another. Widespread dissatisfaction with the diary record gave rise to the extensive experimentation with more refined recording techniques which culminated in the development of the method known as time sampling.

The transition from uncontrolled to controlled observation is exemplified by studies made at the University of Toronto and at the University of Iowa in 1926–28. With the purpose of formulating "certain principles of method for observing and analyzing the play activity of young children," H. M. Bott (**10**)

[5] The most frequently cited example of this common fallacy is Lombroso's association of crime with physical type.

[6] Watson's application of the techniques of animal experimentation to the study of children was an important stimulus to direct observation of children both in natural and in experimental situations.

directed a series of exploratory observations of the free play activities of 15 nursery-school children at the St. George's School for Child Study in Toronto over a period of about a year (1926–27).[7] After considerable experimentation with diary recording, a standard record sheet was devised which narrowed the field of observation to the extent of classifying all observed reactions to the play situation into three categories, relations with materials, relations with adults, and relations with other children.

The child's name, the date, place, time of beginning and ending the observation, along with the observer's name [were] entered in the spaces provided at the top. The body of the sheet [was] divided vertically into three main sections corresponding to the three categories of response previously mentioned.

Under the section on *material* [were] recorded in the four columns: (1) the clock time at which the child took a given toy, (2) the name of the toy, (3) what he did with it, (4) the total time to the nearest whole minute that he was occupied with that toy.

Under the section on *relations with adults* two columns were arranged. Our earlier data had shown that this relationship could conveniently be divided into sub-types and five such categories were selected for trial with abbreviations to facilitate their use. These were as follows:

CA—Child Asserts, *i.e.*, calls attention to himself.
CN—Child Negates, *i.e.*, asks for help or otherwise assumes an attitude of dependence.
CR—Child Resists, a special form of assertion but classed separately because of its peculiar interest.
AS—Adult Stimulates—incites the child to action.
AR—Adult Restrains—checks the child in some attempted action.

These symbols were entered in the narrow left column of this section at the place appropriate in the time sequence; while in the wider column descriptive notes were added in order to check the accuracy of the observer's classification.

In the final section *relations with other children* were entered . . . Here five categories were again selected with appropriate abbreviations.

T —Talking
W —Watching
Int.—Interference
Im.—Imitation
Co.—Coöperation

---

[7] The observational program of which this analysis of free play constituted one phase represented an empirical approach to child study. Its major emphasis was on the importance of observing how children normally behave when left to their own devices before attempting to interpret their behavior in terms of preconceived adult notions and on the need for detecting incipient deviations from normal behavior in time to apply preventive measures. In a later report (12), Bott defined the purpose of her researches as the formulation of a basic plan for the study of personality and the development of a method which would distinguish common from individual traits.

When the action (*e.g.*, talking) was from the child under observation to another child it was entered thus:

T → John

When the action was from another child in the group to the child being observed the arrow was reversed:

T ← John

Where it seemed important the verbatim conversation was entered in the wide column. Similarly descriptive entries were made to cover the other types of behavior, for instance, to show whether interference consisted in getting in a child's way, snatching a toy from him, knocking a child down, or the various other forms that are commonly observed. . . . The use of symbols made possible a quick classification and enumeration of the types of action manifested on a given occasion and also compelled close discrimination on the part of those observing.[8]

The records were taken by several observers, each following the activities of one child continuously for the duration of the play period on a given day.

To test the validity of a social behavior rating scale and a series of related experiments by means of observational records of social behavior, Berne (8) observed 12 children in the preschool laboratories of the University of Iowa during free play and routine periods. Seven of these children were observed by the diary method in the summer of 1926.

Description of the Observational Record

The tedium of recording, classifying and tabulating the observations made in diary form for the seven children was so great that it was necessary to devise a simpler technique for dealing with other observational data. On the basis of the classification of social behavior in the *Rating Scale for Social Behavior of Young Children*, Form 2, a record for observations covering a period of ten minutes was devised for recording the social behavior of the children.

The thirty social behavior traits of the rating scale were placed on the left side of the observational record. At the right of the traits, space was arranged in two divisions, each for a record of five minutes of observation of social behavior. Separate spaces were provided for totaling the number of times each different pattern of behavior appeared within five minute and ten minute periods. Above the space given to the social behavior observations, a place was provided for a record of the occupations of the child.

Method of Using the Observational Record

The following system for recording the behavior was used: For all behavior patterns, with the exception of those designated as "interest" and "coöperation," each item of behavior was tabulated. The figure "1" was used to indicate an item of social behavior corresponding to the one of the pair of the behavior traits at the left side of the observational record blank, and the figure

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[8] E. A. Bott, W. E. Blatz, N. Chant and H. M. Bott, *Observation and Training of Fundamental Habits in Young Children*, pp. 48–51.

"—1" indicated the opposite of that behavior pattern. For example, an instance of obedient behavior was recorded as "1" in the space opposite "obedient," while an instance of disobedient behavior was tabulated as "—1" in the same space. Interest was tabulated in the manner described above, whenever the observer could follow accurately the child's shifts in interest in the group. During group singing and singing-games, the observer was frequently unable to record accurately the child's shifting interest. The records of the five minute periods made during singing and singing-games were encircled to set them off from the other records of interest behavior. In totaling the number of items of interest behavior for a child, the items of the encircled record were omitted. For each child, the average number of items, not encircled, was determined, and that average assigned as the average number of interest behavior items in the encircled periods. For the total observational score for interest, the total of the assigned items was added to the total of the items actually tabulated. Coöperation was most easily tabulated by assigning 1 to coöperative behavior lasting thirty seconds or less. For every succeeding thirty seconds of coöperation another 1 was recorded.[9]

Five children were observed in this manner for five two-hour periods each in 1927–28.

A third investigation, reported by Bridges, is of interest from the standpoint of the timing techniques used. At the McGill University nursery school, the occupational interests of 10 three-year-old children were studied in 1926–27 by means of a simple observational record of the time spent in using different materials (13). The children were required to return one material before taking another and different children were allowed first choice of materials on different days. The following year, in a study of the occupational interests and attention span of 14 four-year-old children, the time scale was expanded to include a record of distractions from work (14).

Two or three children were observed each day and a record was kept of the time each child took out a set of material and the time when he put it back. This was done by means of vertical strokes along a horizontal line drawn on squared paper, each square representing one minute. The nature of the material was indicated by letter symbols written below each stroke. The strokes representing the beginning and end of an occupation were drawn right through the horizontal line. In addition to these, other strokes were drawn just to meet the line which represented the times when the child was distracted during his work. The nature of the distractions was indicated by letter symbols above the line. When a child got up in the middle of his work and returned, the horizontal line was discontinued during this break and continued again when the child returned to work, this period being indicated by a curve above the line.

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[9] E. V. Berne, *An Experimental Investigation of Social Behavior Patterns in Young Children*, pp. 69–71.

If the child talked while still at work, indication of the talking was made but the horizontal line was continued straight along. . . .

For the sake of simplicity in recording, the distractions were grouped under three captions the first initials of which were used as symbols. The first caption, "gazes," included looking up from work and watching other children or visitors without saying anything or getting up from work. The second "talks," referred to occasions when the child talked either to himself or to others while still going on with his occupation. The third was "wanders," which covered the times when the child got up and watched others or played about, returning to his occupation. The time spent in wandering about the room between occupations or at the end of the play period was also included in this group.

When two of these types of distraction followed one another so closely as to be indistinguishable to the observer, the two were recorded as occurring together and both letters were marked. This happened when the child began to look about and then got up from his work (G.W.), or when he was gazing at some one else's work for a few seconds before making a remark (G.T.). In scoring the time from the records, the number of times and the total time spent in gazing, talking, and wandering were counted separately. The number of times and the total time for all distractions regardless of type were also counted, taking care not to count twice over the time which was taken up with more than one form of distraction.[10]

In calculating the time taken up by momentary distractions, represented by a stroke in the records, six seconds or a tenth of a minute was allowed for each. This was considered to be a fair estimate of the time taken up by the usual, short remark of a child, about one sentence long.[11]

These three studies represent intermediate stages between the diary method and the more refined time-sampling techniques developed in the Minnesota, Columbia, and Yale studies described below. In Bott's study, only activities involving materials were timed. The social relations of the children were recorded by descriptive notes or symbols as occurring concomitantly with the use of a given material. Bridges' technique, adapted for use by the regular teachers, represents a combination of highly accurate timing of length of occupation with specific materials with approximate timing of distractions. Berne's method, though bearing the outward semblance of time sampling in the strict sense of the term—the behavior items being recorded in terms of occurrence within a time interval uniform for all observations—presumably did not give a complete record of all

[10] K. M. B. Bridges, "The Occupational Interests and Attention of Four-Year-Old Children," *J. Genet. Psychol.*, 1929, **36**, pp. 553–54.

[11] *Idem*, p. 565.

occurrences of each item within the time interval since the record called for simultaneous observation of thirty items by a single observer.[12]

In these studies, reliability of the data was assumed and, with the exception of Bridges' attempt to avoid a spurious factor in the selection of materials by different children, no control was exercised over the sampling of behavior. In the Canadian studies, the length of the observations was not uniform.

Development of Time-Sampling Techniques[13]

While there was a general trend in observational studies of children at this time toward limiting the scope of behavior records, substituting prepared record forms and code symbols for long-hand description, defining behavior items or categories in objective terms and quantifying observed behavior by the introduction of a constant time factor, time sampling as a scientific approach to behavior study owes its development and its considerable popularity within the past ten years to a series of related studies made at the University of Minnesota in 1926–28 and to the sociological research program of the Columbia Child Development Institute in 1927–30.

The basic philosophy underlying the first of the Minnesota researches was stated in a paper on the quantification of direct observation presented before the Ninth International Congress of Psychology in 1929 (**40**).

In general, the tendency in psychology has been toward the development of methods of accurate observation through careful control of conditions and

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[12] On the basis of a subsequent analysis of these records from the standpoint of the adequacy of the sampling of certain items of behavior, with particular reference to the stability of the sample and the distribution of the time of observation in consecutive and nonconsecutive periods, the authors concluded that the behavior traits were unstable (**9**). That the data did not show a high degree of consistency is not surprising, in view of the number of items recorded and the subjective nature of the definition of many of the categories.

[13] An exhaustive survey of all time-sampling studies in this field is not attempted in this discussion. Studies have been selected from the standpoint of their contribution to the development of the method. More detailed summaries are to be found in a review of time-sampling techniques by Olson and Cunningham (**43**) and in Bott's monograph on method in social studies of young children (**11**).

mechanical records of responses to defined stimuli. In certain fields of investigation our knowledge of effective stimuli for given responses is so limited that we cannot immediately arrange laboratory conditions for the measurement of the complex behavior in which we are interested. In order to describe and analyze the concomitants of the behavior it becomes necessary, therefore, to use some method for recording direct observations of the behavior in its natural setting.[14]

Working under a grant from the National Research Council Board of Fellowships in the Biological Sciences in 1926–27, Olson (**38**) developed a technique for measuring the incidence of nervous habits in groups of children and the amount of these habits in each individual. With the general objective of studying "the normal child with respect to certain characteristics which, in extreme form, are considered abnormal," he undertook to develop criteria of nervous habits in normal children, to determine the genesis and incidence of nervous habits in children, and to develop differential tests and measures. Emphasizing the situation in which observations were made, he called his method "a natural history approach to the problem of measurement—the systematic observation of children in the school environment." Anderson, in the foreword to Olson's monograph (**38**), characterized it as "a method of time sampling, the essence of which lies in the observation of the behavior of each individual in respect to the particular category of activity upon which information is to be obtained, during a period of time that is kept constant for each individual observed." [15] In the form described below,[16] the method was applied to the entire population of a Minneapolis elementary school (636 children in Grades I–VIII).

The observer was provided with a seating chart of each room with the name of the child in each seat and squared spaces for making twenty entries below the name. Space was provided on the chart for identifying data such as grade,

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[14] W. C. Olson, "The Quantification of Direct Observation," *Ninth International Congress of Psychology*, pp. 327–28.

[15] Olson and Cunningham (**43**) later described the "time sampling technique" as "the *systematic recording* of a definitely *delimited unit* of behavior described in terms of action over a *stated time interval* yielding *quantitative individual scores* by means of *repeated time units*."

[16] Two series of preliminary observations had previously been made: a single ten-minute record in each room of the same elementary school and fourteen ten-minute records of a first-grade, a second-grade, and two preschool, groups.

room number, teacher, and date and for the time of beginning and ending each of twenty observations. An ordinary watch with a minute hand was used for recording time. A board with a clamp served for a writing surface.

Method

The observer took a position at the front and left (pupils' left) of the room. . . . The unit of measure was one or more oral habits per five-minute period. Oral habits . . . included thumb sucking, finger sucking, nail biting, and protruding tongue. This means that any penetration of the lips by thumb or finger constituted a manifestation as did any extrusion of the tongue. Putting the pencil in the mouth was not counted unless accompanied by thumb or finger. . . . But one entry was made per child per five-minute period, regardless of the frequency within the period, so that with twenty observations the possible range of scores was from 0 to 20. Each manifestation was recorded under the appropriate name on the chart and in the square with a number corresponding to the number of the observation. The time of beginning and ending each observation was recorded.

Observations commenced with the opening of school (9:00 A.M.) and continued for twenty five-minute periods. The observations were made consecutively except when recess or unfavorable observational conditions intervened.

Continuous and active use of the pencil or hands under the teacher's direction inhibits the manifestation of the symptoms observed. Classes in formal penmanship, music and drill in arithmetic were avoided as were observations during the periods when children were out of their own seats.[17]

The individual frequency scores were related to possible determinants or concomitants of the behavior: age, sex, family history, imitation, breast feeding, fatigue, and nutritional status. The same general method was subsequently applied by a class of students in the psychology of personality, under Olson's direction, to the measurement of whispering in schoolroom situations (**42**). Ten successive five-minute observations were made in each room of an elementary school during the same hour (9:00–10:00 A.M.) on a given day. Records were made simultaneously by two observers stationed at opposite sides of each room. Individual frequency scores, obtained by taking the average for the two observers, were related to grade in school, intelligence, school achievement, and conduct marks.

Parten (**46–48**), during the same year, used a modified form

[17] W. C. Olson, *The Measurement of Nervous Habits in Normal Children*, pp. 31–33.

of Olson's method in a study of social participation, leadership and social play in 42 nursery-school children at the Minnesota Institute of Child Welfare.

In order to obtain a measure of the frequency of group participation each nursery school child was observed for one minute daily according to the method of repeated short samples described by Goodenough [22]. To prevent spectacular behavior on the part of a given child from being a factor in the observer's transition from child to child the order of observation was determined by a prearranged list of the children's names that was systematically varied from day to day. Further errors of sampling were guarded against by dividing the hour into five-minute intervals and rotating observations so that each child was observed an equal number of times during the first 5 minutes of the hour, the second 5, the third 5, and so on.

Mimeographed forms provided space for recording: (1) the names in the order of observation; (2) the initial letter indicating the degree of participation, u—unoccupied, s—solitary, o—onlooker, p—parallel, a—associative, and c—coöperative; (3) the names of all other children in the group; (4) the number of children in the group; (5) a key letter indicating leadership behavior; (6) a T or a Q to indicate that the child under observation was talking or was quiet; (7) a brief description of the activity in which the child was engaged; (8) his remarks; and (9) duration of the activity estimated in terms of v—short time, m—most of the minute, e—entire minute.[18]

Observations were made during the free play hour (9:30–10:30 A.M.), at least 60 one-minute records being obtained for 34 of the children. The six degrees of social participation were defined in terms of concrete situations. In computing individual scores for group participation, arbitrary weights were assigned to each category as follows:

Unoccupied behavior	(U)	—3
Solitary play	(S)	—2
Onlooker behavior	(O)	—1
Parallel play	(P)	1
Associative play	(A)	2
Coöperative or Organized Supplementary play	(C)	3

Goodenough (22), in an article summarizing the work of Olson and Parten and describing a further extension of the method, used by graduate students under her direction, stated the problem with respect to the study of normal patterns of behavior in individuals and described the "method of repeated short samples" as follows:

[18] M. B. Parten, "Social Participation among Pre-School Children," *J. Abn. and Soc. Psychol.*, 1932, 27, p. 252.

It is difficult to devise a series of situations to which the subject will react in such a way as to enable the observer to determine his *habitual* mode of responding to other persons, to emotional stress, or the extent to which he is likely to conform to ordinary principles of ethics in his everyday life. Because of these difficulties, many persons have been inclined to regard the measurement of character and personality with considerable scepticism, and to fall back upon rating scales, personal interviews, case histories and the like as the only available or feasible techniques for these purposes.

During the past few years a method has been developed at the University of Minnesota Institute of Child Welfare which in certain respects is free both from the subjective elements that constitute the chief objections to the use of rating scales and similar devices and from the artificial aspects of the laboratory experiment. It lends itself to all ordinary forms of statistical treatment, and may be used by persons with only a moderate degree of training, is not excessive in its time-requirements and may be adapted to the study of many different forms of behavior. Although the technique is not yet fully developed and further modifications are still being tried out, the results thus far obtained seem sufficiently encouraging to warrant a description of the procedure as it is now used. Briefly stated, this consists simply in the observation of the everyday behavior of an individual or a group of individuals for definite short periods of time and the recording of the occurrence or non-occurrence of certain specified and objectively defined forms of behavior during each of these periods. The number of periods in which the report is positive for a given individual is then treated as his score. Since the number and length of the observational periods are the same for all individuals, a direct comparison of the frequencies or scores is thus made possible. A further requirement is that all individuals be observed under similar conditions, either during the performance of similar activities or when variation in activity is brought about only through the free choice of the subject himself. Such circumstances are provided by the ordinary school class room, the playground, or the free-play hour in the nursery school or kindergarten.[19]

During the fall of 1928, a group of 13 graduate students, under Goodenough's direction, applied a further modification of Parten's technique to the study of six different aspects of behavior—physical activity, talkativeness, laughter, compliance, social participation, and leadership—in 33 nursery school children (**23**). The purpose of this experiment was "to develop a method whereby direct observations of specified modes of behavior might be reduced to quantitative expression on a uniformly graduated scale, and to ascertain their intercorrelations with each other and with such additional measures as might be available through other sources." Each observer made 25 one-minute observations of a single category of behavior for each subject. Four observers took records of compliance; three

[19] F. L. Goodenough, "Measuring Behavior Traits by Means of Repeated Short Samples," *J. Juv. Research,* 1928, **12**, pp. 230–31.

observers, of laughter; and each of the remaining categories was recorded by two observers. Each of the 25 observations per child was made on a different day and no two persons observed a given child at the same time. Observations were made during the morning and afternoon hours of free play with the exception of the records of two students whose schedules necessitated observation at other times. One observed talkativeness during the lunch hour; the other took records of laughter during the story and rhythm period.

All records were made on prepared mimeographed forms so arranged as to reduce the labor of recording to a minimum. . . .

In the space following the words *Observation of* _____ the kind of behavior under observation (as laughter, physical activity, etc.) was recorded. The names of the children, arranged in alphabetical order were mimeographed on the sheets in order to economize time in record taking. The second column, headed *Order of Observation* provided a space for checking the order in which the different children were observed. This order was varied systematically from day to day, since it was thought possible that certain forms of behavior might show constant variational trends from beginning to end of the hour.

The place of observation (playground, gymnasium, or room number) was recorded in the third column, followed by a note as to the child's occupation at the time. In the last four columns the child's behavior score was recorded at fifteen-second intervals during the minute of observation. Recording was done by means of symbols representing the various steps or categories in the scales used. Each observer, therefore, obtained 100 separate records for each child in the course of the 25 observations. . . .

After the data had been collected, the results for all the children were pooled and the scale values for the separate categories were obtained by the use of the formula.

$$d = \frac{z_1 - z_2}{q_1 - q_2}$$

where q_1 and q_2 are the proportions of the total number of observations lying beyond the upper and lower limits respectively of the category involved, and z_1 and z_2 are the ordinates for these proportions. An arbitrary zero point of 3 sigma below the mean was assumed as the point of origin in all cases, so as to do away with negative values. Scores for each child were then computed by multiplying the frequency-score in each category by the scale value of that category, summing, and dividing the result by the total number of observations.[20]

The observational scores for each category, derived by this method, were correlated with those for each of the other categories, with measures of intelligence, height and weight, with

[20] F. L. Goodenough, "Inter-relationships in the Behavior of Young Children," *Child Development*, 1930, **1**, pp. 30–31.

ratings of beauty and attractiveness of personality and with length of nursery-school attendance.

The distinctive features of these three applications of time sampling and their respective contributions to the development of the method may be summarized from the standpoint of their ability to differentiate individuals and the timing and sampling techniques used. Olson's method represents the simplest form in which time sampling has been applied in the child behavior field and was especially suited to the measurement of the incidence of highly specific behavior patterns in large populations. The study of nervous habits, though essentially an exploratory investigation of method and not in itself normative, demonstrated the feasibility of normative studies of such aspects of behavior as can be rigidly defined and easily observed under precisely controlled conditions. But since the focus of observation was the group rather than the individual and the unit of measurement was one or more occurrences of the behavior per five-minute period, the technique did not adequately differentiate among individual children. Olson reported that, in his study of whispering, the method failed to differentiate about 33 per cent of the children. Occurrence within a one-minute sample, the measure of frequency used by Parten, was more discriminative of individual differences than occurrence within a five-minute period. Goodenough increased the discriminative value of the technique still further by subdividing the minute sample into fifteen-second intervals and by differentiating degrees of manifestation of each behavior trait.

The sampling of individual behavior in Olson's studies was unsatisfactory for the reason that all samples were taken on the same day.[21] In the other two studies, the series of short samples for each child was distributed over a period of weeks or months, only one observation being made per day. Observations of the different children on a given day were systematically rotated in order to equalize the effect of situational factors and prevent bias in the selection of the children to be observed. Olson's control of situational variables consisted in the elimination of periods in

[21] In some of the preliminary observations the samples were distributed.

which the normal occurrence of the behavior was likely to be inhibited by the requirements of the situation.

In the Parten and Goodenough techniques, the record was made at the end of the time interval and did not allow for changes in type or degree of activity within the interval. Parten indicated the approximate duration of activities within the minute sample by one of three symbols showing whether the behavior lasted the whole minute, most of the minute or only a short time.

Olson's results were expressed in terms of a simple frequency score obtained by counting the number of observations in which the behavior was observed. In the other studies, the individual scores were composite values obtained by assigning arbitrary weights to the original frequencies.

The Columbia program, though directed toward the same ultimate goal as the Minnesota studies—the development of scientifically valid measures of overt behavior—had a quite different point of departure and process of development. Entering the child behavior field as an empirical social scientist, Thomas (**53**) was impressed by the unreliability and incomparability of existing social behavior data and the need for more satisfactory behavior records as an essential foundation both for the development of significant indices of personality differences and for the ultimate establishment of social norms. Calling her approach experimental sociology, she defined it and described its basic motivation as follows:

> [The approach] is sociological in the sense that its aim is the study of overt behavior in varying situations in the field of social interaction. It is experimental in the sense of developing techniques for the control of the observer in order that scientific records may be obtained both of behavior and of situation, and that statistical analysis—ultimately the necessary tool for evaluating behavior-situation relationships—may eventually be applied.[22]

> The available data in regard to social behavior consist largely of descriptive accounts—case histories and diary records. These are often very illuminating social behavior documents but they present certain difficulties as material for scientific analysis. The data obtained in such records are, at their best, objective, in the sense that they deal with certain verifiable facts, but they are selective, inconsistent, and usually incomparable with other records. This is

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[22] D. S. Thomas and Associates, *Some New Techniques for Studying Social Behavior*, p. 1.

due to the tremendous complexity of any social behavior act and the consequent recording of different elements of these complex acts at different times. At their worst, these records are such an intermixture of facts and interpretation as to be utterly worthless from the scientific point of view. Even at their objective best, the selection and emphasis are more or less dependent on the recorder. The control of this sort of error in our social data is one of the first problems claiming our attention. In other words, our data must become independent of our observers within a small and predictable range of error.[23]

This dissatisfaction with the diary record "as an instrument for recording behavior for research purposes," was based on the results of actual experimentation.

An actual check-up was made by having several observers make diary records of the social behavior of given children. There was a marked tendency for a given recorder to note one aspect in one record; another in the next record. Although trained to make objective records in the sense of including overt reactions only, the result was necessarily subjective in that the recorder, usually unconsciously, selected specific parts of that total behavior act. This selection became, furthermore, inevitably inconsistent over a period of time. The obvious solution to this difficulty was to break up the behavior-complex into relatively simple units which would enable a record to be made of every recurrence of one of these behavior units.[24]

The danger involved in this process of breaking down complex patterns into small units in order that these units might be reliably recorded and might be legitimately comparable one with another was recognized by Thomas (54) in a later discussion of the "observability of social phenomena with respect to statistical analysis."

The reduction of complex activities to simple units seems to be fundamental if observational methods are to yield data of sufficient value for statistical analysis. The units finally evolved often seem far removed from the problem under investigation. That this situation is disappointing is probably due to the fact that, as sociologists, we are accustomed to dealing with all of life, that most of us are reformers at heart and anxious for immediate solutions, and that few of us are willing to break down our problems to a point capable of scientific treatment for fear that we can never build them up again to their original magnificent proportions. These attempts in the observational field are made with a frank acceptance of these points of danger. We cannot hope that they will produce data of immediate significance bearing on important sociological problems. The selection of the field of investigation has, however, been made with a view to some such ultimate significance. That our immediate problems are so largely technical may be due merely to the process of scientific development.[25]

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[23] *Idem*, p. 3.

[24] *Idem*, p. 6.

[25] D. S. Thomas, "An Attempt to Develop Precise Measurements in the Social Behavior Field," *Sociologus*, 1932, **8**, pp. 455–56.

The Columbia studies were concerned, therefore, with the development of techniques for the accurate recording of various aspects of overt behavior and with the solution of specific problems of observer reliability as a means to that end. The first of these studies, made by Barker (6), covered a two-year period, 1927–29, and had as its objective the development of a technique for studying the spontaneous reactions of nursery-school children to material objects and to people. As will be clear from the following summary of the method, this was not a time-sampling study in the restricted sense in which the term is here used. The five-minute interval used served as a matter of convenience in recording rather than as a sampling unit. Observations were of no standard length. In the final records of 10 children, the length of time a child was observed per day varied from ten minutes to one hundred minutes, with an average of sixty minutes.

> A floor plan of the roof was made to scale and two observers, taking records independently, simultaneously charted the movements of some child during intervals of five minutes. These charts of the floor plan were 16 x 11 inches and were attached to beaver board by means of thumb tacks. At the end of an observation, the sheet was pulled off without removing the tacks and placed in a large manilla envelope pasted to the back of the board. After making these double records to study reliability, single continuous records of ten children were made, one observer taking one five-minute record and a second observer the next, because time was sometimes needed in which to finish recording what had been observed.
>
> By the use of colored pencils, a simple activity code was evolved for indicating progress from thing to thing and person to person. Activities were timed with a stop watch. . . .[26]

As compared with Bott's modified form of diary record described above, this recording scheme was vastly more complex. The attempt to record the spatial movements of the child, to describe and time the duration of each successive activity with a different material or each shift from a material to a non-material activity and to make the many fine distinctions required by the activity code inevitably resulted in low reliability of the data, particularly of the measures of social behavior. The results

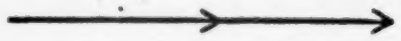
[26] M. Barker, *A Technique for Studying the Social-Material Activities of Young Children*, pp. 2–3. The activity code is reproduced on page 20 with permission of the Bureau of Publications, Teachers College, Columbia University.

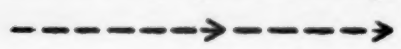
ACTIVITY CODE

Lead pencil line always for a given child's activity

Red crayon line for other person's activity

Lines indicate progress of child

Solid, when spontaneous 

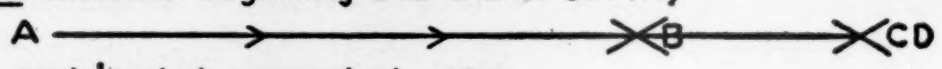
Broken, when directed 

Cross indicates end of activity

Solid, when spontaneous

Broken, when directed

Capitals indicate beginning and end of activity

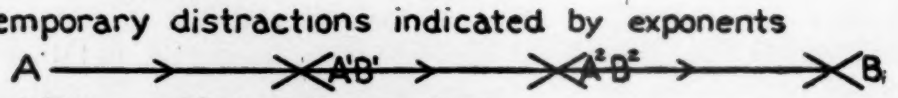


explained by marginal notes

AB = pulling wagon

CD = jumping

Temporary distractions indicated by exponents

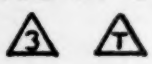


AB = pushing doll carriage

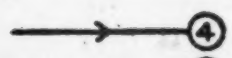
A'B' = hits Paul

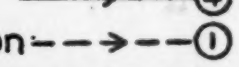
A^2B^2 = smiles at teacher

Circles and Triangles indicate other persons, children by given numbers, teachers by T

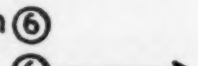
Triangles, if person is involved in child's activity when record begins 

Circles, if person approaches child

spontaneously 

at child's direction 

if child approaches another person ⑥

if person approached leaves child 

S indicates start of five minute record

F indicates finish of five minute record

of this study, though largely negative, were highly instructive in that they emphasized the importance of narrowing the scope of the observational record, of simplifying the technique of

recording and of improving methods of timing behavior in order that each behavior unit might be both quantitatively and qualitatively similar to every other.

Loomis (**32**), in 1928–29, devised a technique for studying a single aspect of the social behavior of nursery-school children, namely, physical contact. Thirty-seven children were observed during a twelve-week period, a total of two hours of observation being obtained per child for 29 children and a total of one hour each for the remaining eight. After preliminary experimentation with a series of thirty-minute samples taken at different times during the day, Loomis decided upon a fifteen-minute period of spontaneous activity for her main study.

> The length of the observation periods was changed from 30 to 15 minutes in order to get observations on more children at nearly the same dates, but even 15 minutes was found to be too long for this purpose. Since six was the maximum number of observations obtainable in one day and three a frequent number, it took at least a week to get around the group, and then often the children already observed were the only ones available. Out of 128 observations in the main study, 23 were interrupted and finished another day and 24 more were interrupted temporarily. The segments pieced together from different days ranged from 1½ to 7½ minutes in length, and this gave trouble when an attempt was made to show the change in contacts at successive observations in relation to time intervals.[27]

Because of the difficulties introduced by the length of the time sample, results were expressed in terms of total, rather than average, number of contacts.

The records were made in code and subsequently transferred to summary sheets. Passive responses were not included in the code.

> A record for Diana might read: /Acc.Agnes/0 Acc.Winifred/0 Push Arnold F/Asst. Connie Coop./ which means that Diana accidentally touched Agnes with a passive response, that Winifred accidentally touched her with a passive response (*i.e.*, Diana was the object of the contact), that Arnold pushed her and she exhibited a response of flight and then that she assisted Connie who coöperated in response.[28]

> The records included some details of the total situation as well as of the actual physical contact. . . . The date, length of observation, place (roof, playground or yard), and the names of all other children present during any

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[27] A. M. Loomis, *A Technique for Observing the Social Behavior of Nursery School Children*, p. 9.

[28] *Idem*, p. 6, note 2.

part of the period were noted and also, as far as possible, the kind of equipment or activity in which the child was engaged. Descriptive notes were made after the observation period. For each contact the records showed its specific category as push, caress, or accident, the person making and the person receiving, the kind of response, and if the contact was the result of a request from another person, this was noted.[29]

The unique contribution of this study lies in its emphasis on sampling. Here, for the first time, we find a definite attempt to apply the criteria of random sampling to observations of social behavior. The problem was to obtain a representative sampling of the physical contacts made and received by each child in social interaction with other children during the period covered by the observations. The following situations were excluded as introducing undue selection, either on the basis of clear-cut observational evidence of a lack of opportunity for social interaction or on the basis of previously accumulated statistical data.

Play with equipment or in games which influenced the kind of interaction: Swing, skipping rope, rolling ball back and forth.

Activities, games or situations in which the child's contacts were under the influence of adults: Luncheon period, pasting Valentines, listening to music and reading of stories, work with clay. (Among kindergarten children and with no teacher present, a wide variety of contacts was observed in use of clay; hence random sampling would have allowed this situation to have been included in the kindergarten.)

Situations in which opportunity was lacking for representative social activity: Presence of fewer than five children under conditions meeting other requirements, *e.g.*, observations were not taken with three children on swing and two at the sand box but were taken with five children at sandbox or wandering about the room.

Situations in which contacts were too numerous to be all recorded: Several children jumping around in a small box or piling over each other under the stairs or using the pulley with its several ropes.

Situations in which a child's behavior was obviously modified by some influence: After the nap when some children appeared sleepy; when a child was waiting for a piece of equipment that had been promised him by a teacher; on the jungle gym when a child's fear led him to stand still and repeatedly call for assistance; when two children were playing together and one was taken from the room by an adult who refused to let the second one go, and she sat down alone.[30]

Beaver's study (7) extended over a two-year period, 1928–30, beginning with an extensive diary record account of the social

[29] *Idem*, pp. 9–10.
[30] *Idem*, pp. 29–30.

interaction of a preschool "gang" of three boys and developing into a time-sampling study of the initiation of social contacts by preschool children. The 20 children in the older nursery group and the 12 oldest in the younger group were observed for at least 24 five-minute periods each. Four types of social contact, each defined to include certain overt behavior acts, were distinguished—the material verbal, the material non-verbal, the non-material verbal, and the non-material non-verbal. Responses were recorded in three categories—acceptance, refusal, and no response.

> In order to facilitate recording as much as possible, a mimeographed form was prepared and a simple code devised. . . . At the top of the sheet on the left-hand side, is the space for the name of the child being observed, and the time during which the record is being made. On the right-hand side is the space for the date and the name of the recorder. The initials in the center of the form designate all children who belong in the group; in this case, all children who attend the nursery school. The initials of all children present at the time when a record is being made are checked. All initiations are recorded in one of the four columns [representing the four categories of social contact] to the left. Responses are entered in one of the two columns at the right. If no response is forthcoming, it is checked in the fifth column from the left, labeled, "No Response." Should the initiation be accepted, it is recorded by a plus sign in the column labeled "Recipient." The same column is used if the contact is resisted or refused, but in that case it is indicated by a minus sign. It was found that a large number of contacts did not end with the initiation and a simple response. A may speak to B and B may reply, but instead of concluding the contact, B's reply may initiate a new response from A, which may, in turn, bring out a reply from B. . . . Our technique takes care of this continuous type of contact through the use of the final column at the extreme right of the form, labeled "Initiator." . . .
>
> The code which we employed is quite simple. At first between the initials of the two children who functioned in the contact an arrow was used to indicate the initiator and the recipient. For example, if A made a contact with B it was recorded A—→B. As time was an important element, the arrow was shortened to a dash. Finally the initials of the child who was being followed and whose name appeared at the top of the record were omitted altogether. Thus if we were following A and she made a contact with B, it was recorded ——B. If, however, B initiated the contact it was recorded B——. Each child was given an initial as a code sign; any teacher was indicated by the Greek letter delta. Any adult other than a teacher was designated an observer, the code sign used being Ob. Still another symbol was needed to denote a group of children as opposed to the individual child, for we found that a remark was frequently addressed to the group in general. We selected the Greek letter pi for this purpose. Acceptances were indicated by a plus sign, refusals or resistance by a minus sign, and no response by a check sign.[31]

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[31] A. P. Beaver, *The Initiation of Social Contacts by Preschool Children*, pp. 9–12.

The following precautions were taken to assure a representative sampling of each child's behavior. Records were taken only when at least four children were present and only during undirected play. No more than two records were taken of any child on the same day and each child's records were equally distributed among the three forty-minute periods making up the two-hour period of free play. Children were observed in aphabetical order with the exception that preference was given to children who had fewer records because of absences. No records were begun when a contact was in progress.

The fourth study in this series (4), which represented the culminating stage of the Columbia program and benefited by the results of previous experimentation, is described in Chapter II since it was the point of departure for one aspect of the research program directed by Thomas at the Yale Institute of Human Relations during the next six years. The Yale research included, on the one hand, a more intensive exploration of problems of observer reliability and consistency; on the other, an application of the nursery-school technique described in the next chapter, with such modifications as were necessary, to the study of behavior patterns in young children, adolescents and adults in situations involving varying degrees of control over the aspects of behavior studied. The adolescents were boys enrolled in the auto mechanics class of a public trade school; the adults, workers in the kitchen of a large cafeteria and in a garment-factory.

The study of reliability was based largely on observations of characters in motion picture films for the following reasons:

> It was clearly impossible to obtain any but the crudest records for measuring the degree of precision of our techniques under ordinary conditions of observation. Agreement between simultaneous observers of the same situation was the only possible means, and it was usually impractical to have more than two observers recording the same situation. No measures of the observer's self consistency were possible, since the observations were of ever-changing situations. The ultimate standard by which the occurrence was checked was the agreement of human observers and there was no record of known greater precision against which their fallibility could be measured.
>
> Moving pictures offered a partial solution to these difficulties. As many observers as desired could observe and record the same situation at the same time. The situation could be reproduced in the same form as often as necessary and consecutive observations could be obtained from the same observers. Observations of the so-called "slow motion" moving picture or even of stilled

frames would presumably make possible a record of greater precision against which the crude observations could be checked. With the hope of disentangling the several factors which contributed to the lack of precision in our observations, therefore, we decided to attempt to measure the degree of precision of the technique through observations of the behavior of characters in moving picture films. We made several series of observations, using both ordinary commercial films and a film specially prepared for our purposes. In some of these series, we used a technique comparable to Form B in the Arrington technique in which discrete items of behavior were recorded in several categories. In others, we used a technique for recording behavior in three mutually exclusive categories, and the record was, by definition, continuous.[32]

A preliminary report of this investigation (**55**) described its purpose, scope, and relation to the Columbia program and presented results of the attempts to define social-material-self activity patterns in the several age groups. Two series of motion-picture observations, made by a battery of four observers, were analyzed from the standpoint of timing and interpretive disagreements, observer biases, and situational factors affecting reliability. A later report (**33**), dealing specifically with problems of observer reliability, describes the use of a stilled frame record of the specially prepared motion picture film as a device for testing the accuracy of ordinary observational records.

This brief review of the methodologically significant Minnesota, Columbia and Yale researches will suffice to indicate the variety of ways in which the time-sampling method has been applied in studies of child behavior. Each of the several applications of time sampling has differed in essential respects from every other—in the length of the time sample used, in number of samples obtained, in the manner of distributing the samples over the total time period, in aspects of behavior studied, number of individuals observed, etc. In most instances, techniques have been applied to small groups and results have been affected by too many variable factors to justify definitive statements either concerning the specific timing and sampling procedures best suited to particular problems or concerning the potential range of usefulness of methods of this sort.

For these reasons, *research is needed along the following lines:*

[32] D. S. Thomas, A. M. Loomis and R. E. Arrington, *Observational Studies of Social Behavior,* p. 116.

(1) standardization of existing techniques with respect to sampling procedures—length of time sample, number of samples, type of distribution of samples, etc. needed to give representative measures of specific kinds of behavior in individuals and groups in particular situations

(2) further exploration of the type of approach used by Olson in his study of the incidence of nervous habits in normal children, in which the point of departure was a carefully formulated problem and a single well-defined pattern of behavior was sampled in a large population

(3) contemporaneous studies of the same aspects of behavior in the same individuals in different situations, with a view to determining whether the obtained indices measure behavior traits which are generally characteristic of the individual or merely patterns induced by a particular situation

(4) longitudinal studies of individuals under carefully controlled conditions, to determine the predictive value of specific indices

(5) intensive analyses of "free" situations from the standpoint of factors operating to stimulate or inhibit the occurrence of various kinds of behavior.

While the ultimate value of methods of this sort must be determined by carefully controlled research of the types outlined above, it is possible, at the present time, to summarize the considerable body of experience acquired in these various experiments in time sampling in terms of the following broad generalizations.

(1) Observer-consciousness appears to be a negligible factor at the early age levels. Record blanks, stop watches and other such paraphernalia seem to have no restraining effect upon the activities of young children, up to at least the age of six years. The young child accepts the observers, after an initial period of natural curiosity, as a non-responding part of his daily environment and pays no further heed to them, provided they ignore him as completely as he ignores them. As the age of the observee increases, however, it becomes more important to take precau-

tions to avoid the possible effect of the observer's presence on the "normality" of the behavior observed.

(2) Reliability of results tends to vary inversely with the amount of behavior observed, that is, the fewer the number of behavior items observed by one person at a given time, the more reliable the observations.

(3) With respect to timing techniques, the Columbia and Yale studies described in the later chapters of this monograph have demonstrated that precise timing of the frequency or duration of behavior with a stop watch cannot successfully be combined with a multiple classification of behavior at the time of recording, even when recording is reduced to a simple code of lines and symbols. The use of a finely graduated time scale, under these conditions, introduces extraneous problems which seriously affect the interpretation of results. The time scale may be effectively used, however, if highly accurate timing is not required and the number of kinds of behavior recorded by one person is definitely limited. When continuous timing of the duration of discrete events in one or more categories, irrespective of any qualitative notations, is desired, some form of automatic timing instrument should be used.

(4) With regard to sampling procedure, it has been fairly well established that the length of the time sample has a considerable effect on the results obtained. Factors to be taken into consideration in the selection of a time sample are the total time available for observation, the frequency of the behavior, the constancy or inconstancy of the conditions of observation and the degree of precision required of the results. The number of samples needed for representative measures of individual behavior will vary with the length of the sample, the frequency of the behavior, the variability of the individual and the relative constancy of the environment. Representative group measures can be obtained by combining a small number of records per individual for all individuals composing the group but the minimum number of samples per individual needed for satisfactory group measures has not yet been definitely established for any of the several aspects of behavior studied.

Assumptions of Time-Sampling Studies

The major assumption underlying the use of time-sampling procedures in these studies of normal child behavior in natural situations is that reliable quantitative measures of the frequency with which an individual normally displays a given behavior in a given situation can be obtained from records of the occurrence of the behavior in a series of randomly distributed short-time intervals of uniform length, and that similar measures descriptive of the normal incidence of a given behavior in a group of individuals can be derived by combining such records for the individual members of the group. This assumption depends upon the reliability and validity of the records: the accuracy with which they reproduce the behavior which actually occurred and the degree to which they represent the most characteristic behavior of the individual or group in the particular situation.

To the extent that the results of these studies were interpreted only in terms of the observed facts, their validity was synonymous with the reliability of the records. Reliability in this sense was tested by means of simultaneous observations of the same behavior by different observers. Agreement between observers was measured in three ways: by computing coefficients of correlation between the scores obtained by different recorders for the same individuals; by calculating percentages of agreement between observers on identical items; and by testing the significance of the differences between the means of paired observers.

Olson made seven ten-minute observations on a group of 35 second-grade children simultaneously with another observer and correlated the two sets of scores, obtaining a coefficient of .75. Applying the Spearman-Brown prophecy formula, he estimated that, if twice as many observations had been made, the coefficient of reliability would have been .86. Parten took simultaneous records with three other persons, each observer making seven notations in one-minute samples of 16 children. One observer agreed with Parten on 92 per cent of the 112 separate items recorded, another, on 89 per cent, the third, on 86 per cent. In

Goodenough's experiment, simultaneous observations on each of a number of children were made by the members of the group until " exact agreement in classification was obtained in at least 95 per cent of the independent observations, with no disagreement greater in amount than one step on the scale." In the Columbia studies, tests of observer reliability and reliability of categories were more extensive. Barker and Arrington analyzed, respectively, 366 and 300 simultaneous records made by four observers working in six different combinations; Loomis' records were tested by results of about four hours of simultaneous observation by two pairs of observers; and Beaver took 140 five-minute records simultaneously with another trained observer.

The extent to which the obtained behavior samples represented the most typical behavior of the children in the situations in which they had been observed was measured indirectly by various tests of internal consistency of the data. The most common method was to correlate measures based on odd-numbered samples with corresponding measures based on even-numbered samples. These tests were relatively simple in the first two of the Minnesota studies. Olson correlated scores based on 7 odd ten-minute observations with those for 7 even ten-minute observations of a first-grade and a second-grade group, obtaining coefficients of .67 and .63, respectively. Using the Spearman-Brown prophecy formula, he predicted that the reliability of the 14 observations would be represented by coefficients of .80 and .77, respectively, for the two groups. These observations had been made on four different days, with a lapse of eight days between the first and last records. The correlation was higher for a group of preschool children for whom each observation had been made on a different day (r=.87, Spearman-Brown, .93). Parten tested the applicability of the Spearman-Brown formula to her data empirically, finding almost identical agreement between the actual and the expected results.[33]

[33] Upon this limited test has been based the assumption that the prediction formula is generally applicable to any data derived by time-sampling methods.

> For 19 children observed over a 20-day period the composite scores for the 10 odd days correlated with those for the 10 even days by the rank difference method yielded a coefficient of .76.
>
> When twenty odd-even day observations were weighted, scored, ranked and correlated the coefficient was .90. Hence twenty one-minute observations give a reliable portrayal of a child's participation in group activities.[34]

Arrington correlated means per child based on odd and even five-minute and one-minute samples. Loomis, Beaver, and Arrington compared measures based on direct observation (the child's own records) with corresponding measures based on indirect observation (the records of other children). Goodenough measured reliability in her study by finding the mean inter-correlations between the scores of the separate observers for each trait and correcting by the Spearman-Brown formula.

While these various tests gave substantial evidence of the reliability and validity of the obtained measures as representative of the customary behavior of the children in specific situations, it should be recognized that they measured only gross reliability and did not allocate inconsistencies in the data to their several sources. Consensus of observers as a criterion of reliability of recording is a purely relative test which does not distinguish between observational, recording, and interpretive errors nor between the good and the poor observer, and the measures of internal consistency do not differentiate between errors of measurement, inconsistency of the individual, and variability due to changes in the environment or in the conditions of observation.

A second assumption implicit in most of these time-sampling studies, though not inherent in the method itself, is that the quantitative measures for a given individual will remain relatively constant from one situation to another during a given developmental period, provided that the situations favor the spontaneous occurrence of the behavior in question. It was assumed that the individual who had a high frequency of a given behavior relative to other individuals in one situation would also have a relatively high frequency of that behavior in other similar situations. It was also hoped that the measures would show a considerable degree of constancy from one period of development to another. These assumptions depend upon the extent to which

[34] M. B. Parten, *op. cit.*, p. 253.

the effect of situational variables was excluded from the obtained measures, upon the consistency or variability of the individual and upon the similarity of the situations compared.

Because of the considerable amount of time required for an adequate empirical validation of these assumptions, the evidence presented in these studies concerning the constancy of repeated measures for the same individuals is relatively slight. Olson correlated dual measurements obtained on seven groups of children. In the case of four of these groups, the repeated measurements were the incidental result of the initial experimentation with different methods. The number of days between observations ranged from 8 to 365 for the different groups. Coefficients of correlation between the two sets of scores varied from .26 to .80, the highest being obtained for the group observed after the shortest lapse of time. "Corrected for the unreliability of the correlated measures," the values ranged from .32 to .98. As factors which may have operated to reduce the size of these correlations, Olson mentions a change of definitions and a change of rooms and teachers affecting the comparison of the measures for two groups and the greater skill of the observer in the later observations. Loomis was able to observe four of her original group of nursery-school children a year later in the kindergarten and, with one exception, found evidence of the persistence of the characteristics which had distinguished the children in the previous observations. Arrington found a high degree of consistency between her results and those obtained by other investigators in the same situation during the same period. She also measured the constancy of specific patterns, in 15 children observed two years in succession in the nursery school, in terms of rank-order correlations, decile ranks and amount and direction of change.[35]

Goodenough found that talkativeness scores for 33 children based on one observer's records during the free play period and on another observer's records during the lunch hour gave a correlation of .42. This low correlation is attributed to situational differences. The fact that the lunch period scores were found to correlate more highly with the subjective estimates of

[35] A further analysis of the same data is presented in Chapter V.

ten independent judges than the free play scores was interpreted to mean that the lunch hour was superior to the free play period as a situation in which to obtain representative measures of talkativeness. The general conclusion drawn from these findings was that " a truly valid measure of behavior must be based upon observations taken under such a diversity of circumstances as to constitute a representative sampling of the child's daily life." While it is probably true that a variety of situations must be sampled in order to obtain a single representative index of an individual's characteristic tendency with respect to the display of a given behavior, the evidence on which the above inference was based appears to be inconclusive, in view of the many variables affecting the results of this study. On the basis of these and other unpublished data, Goodenough (24) points out that " a change in the situation . . . not only brings about a change in the pattern of behavior most typical of the entire group but also changes the rank-order of the individuals composing the group " and questions the predictive value of measures derived by time-sampling methods and the possibility of ultimately establishing normative standards through techniques of this sort. The fact that the individual members of a group do not hold exactly the same positions relative to one another with respect to frequency of a given behavior when observed under varying conditions does not seem adequate justification for these conclusions since rank-order correlations assume a greater degree of consistency in highly specific patterns of behavior than ordinary common sense leads us to expect, especially when applied to small groups the individual members of which are not sharply differentiated one from another. Furthermore, supposedly well standardized measures of physical and intellectual traits do not yield constant results under varying conditions.

A third assumption implicit in Olson's initial study and in the studies reported in this volume is that the relative frequency of a highly specific behavior act may be a significant index of a more complex behavior trait. Olson assumed that the frequency with which a person puts his finger in his mouth (*i.e.*, sucks his thumb, bites his nails, etc.) or protrudes his tongue may be taken as a criterion of a neurotic tendency. In the studies described below,

it has been assumed that the frequency with which an individual talks to other people, under conditions of free social interaction, may be taken as an index of the more general trait, sociability, or of interest in other persons. This sort of assumption obviously rests on more tenuous ground, being dependent on substantial external evidence of the relationship between the specific pattern and the more complex trait. These assumptions have not as yet been adequately validated.

Advantages and Limitations of Time Sampling

The advantages and limitations of time sampling as a method of studying overt behavior have been discussed by Anderson (3, 25), Goodenough (22–25), Olson (39) and others. The principal advantages of the method, as suggested by the early studies of Olson, Parten and Goodenough, were its objectivity, its applicability to the study of normal behavior in ordinary life situations, its ease of application and the fact that it gave quantitative results capable of statistical analysis. The quantitative measures could be made exactly comparable for all individuals or groups studied under similar conditions and their reliability could be determined by the usual statistical procedures. As compared with the experimental or testing approach, no elaborate apparatus was required and no preliminary rapport with the subjects was needed. The method "was not excessive in its time-requirements." A further advantage, suggested by the studies reported in this volume, lies in the fact that measures of individual variability can be obtained as well as measures of the total or average frequency of specific kinds of behavior, when the time sample is subdivided into shorter units and frequency is measured in terms of these units.

Experience in using the method in uncontrolled situations has suggested that some of the claims advanced on the basis of early research in the field were too optimistic. It has been found, for example, that to obtain a representative sample of the most typical behavior of an individual in an uncontrolled environment, a greater expenditure of time is needed than was at first supposed. The presence of the observer, as already indicated, may become a problem of some importance in studies of older children

and adults. The measurement of the reliability of behavior records by the accepted criterion—simultaneous observation of the same events by different observers—has introduced some technical problems. The assumption that measures derived in one situation would necessarily apply to other situations has not been proved. But these findings are, after all, not surprising in view of the relatively limited evidence on which the early claims were based. The unique advantage of the time-sampling method is, in the last analysis, that it facilitates the comparison of individuals or groups observed under similar conditions in terms of highly reliable objective measures. Its basic limitations are those inherent in all quantitative observational methods.

Conclusions

In conclusion, it may be said that time sampling is a quantitative observational method capable of application in various forms to problems of measurement and description in behavior studies. The ultimate importance of the method depends on the extent to which it yields information which cannot be obtained equally well by other methods and on the range of problems to which, and situations in which, it can be applied. As a device for obtaining diagnostic or prognostic indices of individual behavior, its value depends on the extent to which the obtained measures can be shown to be representative of the individual and the extent to which frequency and duration of behavior acts can be shown to be significant indices of personality or behavior differences. Further applications of the method to large populations may show that time sampling has a considerable range of usefulness as a means of measuring the occurrence of specific patterns in groups homogeneous as to one or more characteristics (age, nationality, economic status, education, religion, culture, etc.), of verifying generalizations based on clinical observation and of evaluating behavior-situation relationships. Time-sampling techniques may also prove useful in studies of individual variability and consistency under varying conditions and at different stages of development and in eventually isolating the factors operating to produce greater variability in some individuals than in others and in some situations as compared with others.

PART II

A PROGRAM OF TIME-SAMPLING STUDIES OF CHILD BEHAVIOR

CHAPTER II

THE PROGRAM

The five-year series of time-sampling studies described in this chapter includes observations of nursery-school children made at the Columbia Child Development Institute in 1930–31 [1] and of kindergarten, first- and third-grade children made in the New Haven public schools in 1931–35, under the auspices of the Department of Social Statistics [2] of the Yale Institute of Human Relations. Although these systematic observations of the "normal" behavior of young children in "free" situations were an integral part of a methodological program focused on the solution of problems of observer control in uncontrolled life situations, they were also designed to yield information concerning developmental and individual patterns in the children observed. With this latter aspect of the investigation as a focus, the program of observational studies of young children is here discussed in terms of (a) its objectives, (b) the hypotheses it was designed to test, (c) the children studied, (d) the situations in which they were observed, (e) the behavior records, (f) sampling procedure, and (g) the analysis of the records.

Objectives

The primary aim of the nursery-school study was to develop a reliable technique for recording, in quantitative terms of frequency and duration, the overt responses of preschool children to the social and material stimuli of their environment. It was hoped that this technique would measure (a) individual differences in socio-material activities and interests and (b) the incidence of specific patterns of reaction to persons and materials in

[1] The previous report of the nursery-school study (4) was primarily concerned with the reliability of the recording technique developed. For purposes of comparison with the results of the later studies, the nursery-school records have been analyzed in the same manner as those of the older children.

[2] Previously designated as the Department of Social Science Methodology.

groups homogeneous with respect to one or more characteristics. As a device for differentiating individuals in terms of degrees of interest in other persons as compared with degrees of interest in material objects, the technique was designed to answer such questions as these:

To what extent does a child react overtly to his socio-material environment, as compared with other children of the same developmental level? Does he react predominantly to the material elements, or to the social, or equally to both?

In an environment rich in material resources and given relatively unrestricted access to a variety of materials, does a child have a wide or narrow range of selection of materials? How much time does he ordinarily spend in active manipulation of materials? When occupied with materials, is he easily distracted?

In a highly stimulating social environment, does a child contact many or few individuals? Does he converse much or little with his associates? To what extent does he communicate with others through physical, as well as verbal, contact? Does he make contacts predominantly with those of his own age or with his elders?

The major objectives of the New Haven studies were (a) to determine the applicability of this technique in " free " situations in cross-sectional studies of the normal behavior of individuals and groups and in longitudinal studies of individual development, (b) to define age and sex differences in frequency and type of social contact and in use of materials, and (c) to define individual patterns of involvement in, or withdrawal from, active contact with materials and with persons and to study the consistency of these patterns at successive stages of development.

Hypotheses

Superimposed upon the common cultural patterns of behavior toward materials and toward persons are individual differences in degree of responsiveness to material and to social stimuli sufficiently striking to have given rise to the notion of a materially-

minded and a socially-minded type of individual.[3] If the contrasting patterns of the physicist and the politician, the engineer and the lawyer, the mechanic and the salesman, are conceived as predetermined either by an innate capacity for development, or by an early environmental conditioning, in the one direction or the other, or by a combination of the two, it is plausible to suppose that symptoms of such predispositions might be detected, under conditions of complete freedom as to choice of activity, as early as the preschool period. In a situation as conducive to spontaneity of action as the nursery-school play period, it seemed likely that a child's interest in the material, as contrasted with the social, aspects of his environment, or *vice versa,* would be reflected in his choice of activity.[4] If individuals could be distinguished in early childhood on the basis of consistent sociomaterial patterns by means of quantitative behavior indices derived from systematic observations of their undirected activities and if these individual patterns could be related to the pattern characteristic of normal development, it should be possible to detect undesirable behavior patterns at an early stage and to guide development into more desirable channels.[5]

This general hypothesis presupposes (1) that individuals can be differentiated in terms of their overtly expressed interest (a) in manipulating the material components of their environment and (b) in exploring its social resources, as opposed to (c) withdrawal from active contact either with materials or with persons, (2) that techniques can be devised for recording the

[3] Freyd (**21**) attempted to differentiate the "personalities of the socially and the mechanically minded," "men whose primary interest is social and men whose primary interest is in machines," using students preparing for executive positions in industry and students of mechanical and commercial engineering to represent the latter group, life insurance salesmen to represent the former. This common-sense concept of a dichotomy of interests and capacities is implicit in many of our vocational programs.

[4] Observation of children in this environment had suggested the existence of striking individual differences in patterns of reaction to people and to things.

[5] This hypothesis should be evaluated in the light of the thoughtways of the period in which it was conceived. Since the inception of this program, the concept of behavior types has fallen into disrepute and our ideas of what constitutes either "normal" or "desirable" behavior are less clear-cut than at this earlier period.

overt activities of individuals in such a way as to yield significant objective indices of (a) and (b) above, and (3) that the absence of both material and social contacts can be taken as an index of (c).[6] The selection of behavior items[7] within the material-social-self classification was based upon the further assumptions that (4) the amount of time an individual spends voluntarily in active manipulation of materials may be a discriminative index of his degree of interest in materials *per se,* (5) the frequency with which an individual communicates with others through speech or touch (physical contact, with or without accompanying use of materials) and the number of different individuals contacted by him per uniform time period may constitute discriminative measures of his social interests,[8] and (6) the infrequency of active involvement in social interaction, as indicated by low measures of the sort indicated in (5) above, may be a discriminative index of incipient social maladjustment.

The Children

One hundred and twenty children were observed under comparable conditions for at least 24 five-minute periods each.

[6] H. M. Bott (10) and Barker (6) had distinguished between activities concerned with other persons and those concerned with materials. The third category—activities concerned neither with persons nor with materials—was introduced to give a complete record of the distribution of time during each observation.

[7] Since the records were designed to yield significant overt behavior indices which would describe the child's self-determined relationship to his environment, emphasis was on functional behavior, on the positive reactions of the individual, the contacts which he made with the materials to which he had access and with the persons to whom he was exposed. Those aspects of behavior were selected, therefore, which would best represent the amount and kind of response normally made by the child to his socio-material environment and which could be defined with sufficient precision to be recorded with a high degree of uniformity by different observers.

[8] Sociability is generally defined to include both social responsiveness and social participation. In the present study, active participation in social activity has been assumed to be a more discriminative measure of the basic social tendency of the individual than mere responsiveness to the presence of other persons, as indicated by smiling at others, laughing with others, spatial proximity to others and active watching of others. Moreover, attempts made at the nursery-school level to determine objectively whether spatial proximity was voluntary or accidental and to define spatial contact with any degree of precision except on a purely arbitrary basis had met with little success.

Forty-one of these children were enrolled in the nursery schools of the Child Development Institute of Teachers College, Columbia University; the remaining 79, in Public Schools A, B, and C in New Haven, Conn. School A was originally selected for the kindergarten observations because it was a demonstration school in which teachers and children were accustomed to the presence of visitors and observers. Observations were shifted to School B in an Italian neighborhood in the fall of 1932, on the assumption that the Institute program was to be focused on a single nationality group (the Italian) and that a coördinated body of information concerning this group would be obtained by pooling the results of various approaches to the study of the same families. Schools A and C were used for the first-grade observations because they had a free work period comparable with that of the kindergarten.[9] An added incentive for the selection of School A was the fact that children previously observed in the kindergarten were still enrolled in this school and could be observed under conditions similar to those of the first set of observations.

The period covered by the observations of each group and the number of children per group, subdivided by sex, are summarized below.[10] Nursery School Group III included 15 children who had been observed in Group I during the corresponding months of the preceding year and the eight third-grade children had been studied in 1931–32 in the kindergarten.[11] The public-school

[9] A series of observations made in the first and second grades of School B is not reported here because of the incomparability of the ordinary classroom situation with the free work period in which the main body of data was accumulated.

[10] A nursery-school boy and a kindergarten girl, observed for the same length of time in two successive years in the same situation, are included, respectively, in Nursery School Group II and Kindergarten Group II in the table. In School C, the fact that a teacher-directed reading period replaced the work period on certain days of the week in the first-grade rooms made it necessary to alternate observations between two rooms in order to obtain records under comparable conditions on all five days of the school week.

[11] In addition to the eight third-grade children for whom records have been analyzed, comparable observations were made of four other children also observed in the 1931–32 kindergarten group and still attending School A. These records were later discarded because of poor sampling conditions. A measles epidemic which reduced the attendance in the other third-grade room of

children were selected from the total enrollment in each classroom on the basis of the purely arbitrary criteria of chronological age order and sex, an even balance between boys and girls being maintained, as far as possible, in each group.[12] In the nursery

Group	Period of Observation	Number of Children		
		Boys	Girls	Total
Nursery School				
I (Younger Group)	Feb. 1930–May 1930	9	10	19
II (Younger Group)	Oct. 1930–May 1931	10	7	17
Combined Groups		19	17	36
III (Older Group)	Feb. 1931–May 1931	9	11	20
Kindergarten				
I (School A)	Nov. 1931–June 1932	7	7	14
II (School B)	Oct. 1932–June 1933	11	10	21
III (School B)	Dec. 1933–June 1934	8	7	15
Combined Groups		26	24	50
First Grade				
I (School A)	Jan. 1935–June 1935	7	8	15
II (School C, Rm. 1)	Jan. 1935–June 1935	3	4	7
III (School C, Rm. 2)	Jan. 1935–June 1935	4	3	7
Combined Groups		14	15	29
Third Grade				
(School A)	Jan. 1935–March 1935	5	3	8

school, all children who were regular in attendance were included. The age range for each of the main groups and the average age per child, as of the date of the first observation, are summarized below.

Group	Age (in Months)	
	Range	Average
Nursery School		
Younger Group	20–33	27
Older Group	35–49	40
Kindergarten	55–73	66
First Grade	76–85	80

School A to about half the normal number during the period in which observations were being made so distorted the normal situation that the records of the three children enrolled in this room could not be considered representative of their usual behavior. One child who had been promoted to the fourth grade was observed for the requisite length of time but was so obviously conscious of the fact that she was being observed that her records were also discarded.

[12] Occasional exceptions were made to the rule of selecting by age order when there was some special reason for including or excluding a particular child. A pair of twins and siblings of children previously studied were included; children known to be extremely irregular in attendance, excluded.

The nursery-school children and those enrolled in School A represented for the most part the higher socio-economic groups, the professional and business classes. Those in Schools B and C, on the other hand, were drawn largely from the less favored groups.[13] With the exception of the kindergarten group which was predominantly Italian, for the reason noted above, the children represent a heterogeneous selection from the standpoint of nationality.[14]

The Situations

The nursery-school children were observed during the morning play period which lasted ordinarily from 9:00 to 11:00 o'clock; the public-school children, during the work period which was part of the daily program in Schools A, B and C. The choice of "free," rather than experimentally controlled, situations was predetermined by the objectives of the investigation; namely, the study of normal patterns of response to a socio-material environment and the refinement of methods of observing and recording behavior in life situations. The free play and work periods seemed best suited to these purposes for the following reasons: they constituted segments of the child's daily environment with which he was thoroughly familiar; they imposed a minimum of restraint upon his choice of activity; they afforded abundant opportunity for manipulation of materials and for contacts with other persons; they facilitated observation of a number of children under comparable conditions; and the composition of the groups was relatively constant during the period of observation.

Nursery Groups I and II were observed on the roof playground of the five-story building occupied by the Child Development Institute; Group III, in a large play yard located across

[13] This overweighting of the nursery-school and kindergarten groups in favor of the high and low ends of the socio-economic scale, respectively, would assume importance in the interpretation of the group data if socio-economic status were significantly related to the behavior studied but the results give no indication of a direct relationship between this factor and the aspects of behavior observed.

[14] Relationships between nationality and behavior patterns cannot be inferred even for the Italian group because standards of comparison for other nationalities are lacking and because the range of variation among the Italian children coincided with that for the entire group (that is, the extremes of the entire group were Italian).

the street from the Institute building.[15] The two playgrounds differed in size, the yard having a considerably greater amount of space and greater distances between the swings, jungle gym and other stationary apparatus than the roof.[16] The materials available for the younger children included stationary equipment—jungle gym, slide, sand box, walking board, swings, steps and cupboard for toys—and a great variety of movable objects—wagons, trucks, wooden boxes, blocks, doll carriages, dolls' clothes, tricycles, kiddie kars, sand toys, hammer and nails, kegs, shovels, brooms, etc. The supply of each type of material was necessarily limited so that the children either shared the desired materials or took turns in using them. Group III had access to most of these same kinds of materials plus other equipment planned primarily for older children—a see saw, rabbit pen, etc. Each group had an enrollment of 20 children but it was extremely rare for all the children to be on the playground at the same time. Absences were frequent and children were constantly being withdrawn from the play group for tests and experiments and for attention to physical needs. Four or five adults—regular teachers, practice teachers, observers and visitors—were ordinarily present in each group, the number of adults present at any one time being regulated by a prearranged schedule designed to prevent overcrowding. Group I was observed under particularly crowded conditions since the roof play space was shared with the older group at the time the observations were made.

The play period was an ideal situation in which to study the spontaneous activities of young children since freedom to explore, and experiment with, things and people was practically unlimited. Minor conflicts and difficulties were usually settled by the chil-

[15] Since the children played outdoors in all except the most inclement weather, the majority of the observations are of outdoor play. To complete the required number of records, however, it was necessary to include, for practically all of the children, a few records taken in the indoor playroom. The number of indoor records included in the total sample for any child was too small to have any effect on the behavior indices.

[16] Murphy (35), in comparing these two playgrounds, estimates that the roof afforded about 2,000 square feet of play space; the play yard, about 15,000 square feet.

dren themselves, the teacher intervening only when a child's activity threatened the welfare of other children or was strikingly divergent from adult standards of desirable behavior. In rare instances, a teacher might exert pressure to entice an inactive child to use materials but such adult direction of activity was timed so as not to interfere with the observers' records which presupposed spontaneous choice of activity by the child. Under these informal conditions, a child might occupy himself exclusively with materials; he might join with others in coöperative use of the same materials; he might devote his efforts predominantly to exploring the social resources of the situation or he might avoid active contact both with materials and with other persons, merely watching the activities of others without becoming involved in them himself.

The kindergarten work period, as its name suggests, restricted free choice of activity to the extent that the children were expected to work with materials during the major part of the period and to produce some visible evidence of their efforts. Although the situation was thus weighted in advance in favor of preoccupation with materials, the children were free to work where they pleased (except when the materials themselves were stationary or had to be used in a particular place), to move about the room at will and to converse freely on any subject, whether or not it was relevant to the work activity. Within the limits of the resources available and the educational objectives [17] of the program, the choice of materials to be used on a given day was made by the child himself. Children were encouraged to use a variety of materials in order that they might become

[17] Thompkins (**56**) defines the educational function of the work period as follows: "Our work period in the kindergarten serves many purposes, of which these two are outstanding: to help each child to make social adjustments; and to develop good work habits in the children. . . . The work period is a natural situation in which the child works at a self-chosen problem. In working at a self-chosen problem, in contrast to an imposed problem, the child accepts more willingly higher standards of workmanship and forms more easily good working habits. The child learns to respect the rights and privileges of the other children. He learns to work in groups and to submerge his personal desires in the larger interests of the group. He learns to complete a task once begun. He becomes independent, able to criticize his own work and to accept criticism from others."

familiar with the several skills involved in the course of the school year but the same materials might be used several days in succession if the project could not be completed in one day or if the child lacked the necessary initiative for undertaking a new task.

Each of the kindergarten groups had an enrollment of 40–50 children and was supervised by two teachers. The usual procedure was for the children to select their work when they first came into the room in the morning after removing their wraps. When a child finished a piece of work, he usually showed it to the teacher and received further suggestions or, if the teacher approved of his work and time permitted, he selected another task. The length of the period varied somewhat from day to day according to the requirements of the daily program. It was shortened on days when some unusual feature was added, as, for example, a general assembly, and tended to be longer when preparations for a holiday (Christmas, Easter, Valentine's day) were in progress. At the close of the period the teacher gave the signal to stop work and the children gathered in one part of the room to discuss the morning's work. Especially good pieces of work were commended and children who had wasted their time were rebuked.[18] The work of the entire group was occasionally interrupted for brief opening exercises,[19] group singing or announcements or when the group became too noisy and the teacher imposed a disciplinary period of silence or cessation of work.[20]

The following activities were observed in the kindergarten: drawing or coloring with crayons, building with large or small blocks, playing dominoes, playing with wooden animals, making words with wooden letters, sewing, stuffing cloth dolls, animals, etc., with cotton wool, cutting and pasting (making valentines, Easter rabbits, etc., cutting awning for house, making paper basket, hat, kite, pattern, flowers, etc.), stamping letters on paper,

[18] With such large groups to supervise, it was impossible for the teachers to watch all the children at the same time and lazy children sometimes escaped notice, doing as little and as easy work as possible.

[19] These exercises occurred irregularly after the beginning of the school year.

[20] Observations were discontinued during any of these interruptions and after the signal for the close of the work period.

modeling with clay and sand, painting pictures and objects, drawing on the blackboard, sawing, hammering, etc. (making objects out of wood or cardboard), looking at picture books, working picture puzzles, blowing soap bubbles, putting pegs in boards, stringing beads, and playing "house" with dolls. School B had a slide and a rocking boat which children were permitted to use when they had finished their work.

The three first-grade rooms had enrollments of 30–40 children. The procedure varied somewhat in the three situations. In School C, the children took assigned seats when they came in the morning and the work hour was preceded by a short period of directed activity (opening exercises, singing or planning of the day's work). The teachers sometimes called for volunteers to use certain materials or suggested that certain children work on a particular project. The children in Groups I and II worked at small tables and had relatively little space in which to move about. The room occupied by Group III was more comparable in size and arrangement with the kindergarten rooms. Group I was observed under ideally free conditions, thanks to the exceptionally generous coöperation of the teacher. The children were not required to work with school materials and were permitted to bring toys or games from home. It was predominantly a social situation in which materials served as a medium for social contact. The teacher took pains to keep aloof from the children's activities as much as possible during this period. This combination play and work period began as soon as the children arrived in the morning and lasted for about half or three-quarters of an hour.

The first-grade occupations varied somewhat in the three rooms. Activities common to all groups were block-building, drawing, picture puzzles, drawing at the blackboard, painting, playing "house," cutting and pasting, and reading (silent reading or reading aloud to one or more other children). In Group I, a variety of toys and games (quoits, roulette, checkers, dominoes, etc.) were used. Sewing was an especially frequent occupation in Group II and occurred in Group III. Weaving and playing "school" occurred fairly often in Group III.

The work period in the third grade did not always come at the same time each day and was occasionally omitted when time was needed for other activities. In this situation, all work activity was related to a coöperative group project, the construction of a replica of a Pueblo Indian village. The occupations, all of which were suggested by study of the Indians, included mat-weaving, basketry, clay modeling (pottery-making), drawing with crayons and charcoal, metal work, making cardboard ladders, making small animals and people out of cotton wool, making labels, painting and the actual construction of the village out of cardboard, sand, etc. Children were usually grouped according to the materials they were using but were free to talk and move about the room whenever necessary. Most occupations required several days to complete so that a child was usually associated with one group predominantly, then with another, as he changed projects. As in the kindergartens and first grades, the room was equipped with movable chairs and tables. This third grade had an enrollment of 39 children.

The Behavior Records

The general method of recording was the same throughout the investigation. Two observers, noting different aspects of behavior in the same child, took successive five-minute records of as many different children as could be observed during the daily play or work period, following the observed child as he moved about the room or playground.[21] The recording equipment in the nursery-school study consisted of beaver boards about 11″ by 13″ to which stop watches and record blanks were attached. In the New Haven studies, wooden boards 4¼″ by 7¼″, just large enough to hold the stop watch and the mimeographed record form, folded to about two-thirds the size of the board, were used. The record forms contained a time scale

[21] The technique of simultaneous recording by two observers was adopted in the nursery-school study when experience made it clear that one person, however well trained, could not record reliably as many aspects of behavior as were included in the record. The introduction of more than two observers would have overcrowded the child's environment and might have affected the naturalness of the behavior observed.

Behavior		Nursery School	Kindergarten	First and Third Grade
Language	Social	△=teacher π=group O=observer V=visitor Initials for children	△=teacher π=group O=observer V=visitor Initials for children	△=teacher π=group O=observer V=visitor Initials for children
			x=speech to person, identity of person addressed indeterminate s^{π}=singing to or with group	r^{π}=reading aloud to group r^{MB}=reading aloud to child MB s^{π}=singing to or with group s^{MB}=singing to or with child MB
	Nonsocial	✓=talking to self ^=vocalizing	ss=talking to self ✓=non-verbal vocalization s=singing w=whistling h=humming	
Physical Contact	Subject—initiated by observed child	Initial or symbol of person contacted Ex.—MB	Initial or symbol of person contacted +m above symbol if material is involved Ex.—MB or MB^m	Initial or symbol of person contacted *Form A—Physical Contact* or *Material* Column +m above symbol if material is used to contact person Ex.—MB or MB^m
	Object—initiated by another person with observed child	*Encircled* initial or symbol of initiator of contact Ex.— (MB)	*Underlined* initial or symbol of initiator of contact +m above symbol if material is involved Ex.—$\underline{MB}$ or $\underline{MB^m}$	Initial or symbol of initiator of contact +m above symbol if material is used to contact observed child *Form B—Physical Contact* Column Ex.—MB or MB^m
	Subject-object—contact in which both observed child and other person are active participants		*Line above and below* symbol of person contacted +m above symbol if material is involved Ex.—$\overline{\underline{MB}}$ or $\overline{\underline{MB^m}}$	Initial or symbol of person contacted *Form A—Physical Contact* or *Material* Column *Form B—Physical Contact* Column Ex.—MB
Laughing		✓		
Crying		✓		

subdividing the five-minute period into 60 five-second intervals and each item of behavior was timed either in terms of duration, to the nearest second on the time scale, or in terms of occurrence within a five-second interval. In the kindergarten and first-grade records (Figs. 2 and 3) the column at the extreme left of the record blank included a consecutive numbering of the intervals from 1 to 60 as well as the figures (0, 5, 10, etc.) indicating, in seconds, the beginning point of each successive time interval.

In Form A of the nursery-school and kindergarten records (Figs. 1 and 2), vertical lines were drawn in the appropriate column to indicate duration of each activity to the nearest second on the time scale. Vertical lines in any column of the other records indicated the continuation of an activity begun in a previous interval, if joined to the symbol representing the beginning of the activity, or repetition of the same type of contact with the same individual, if not joined to previously recorded symbols.

The code of symbols used at each stage of the investigation in the records of language, physical contact, laughing and crying is given on page 49. Blank spaces indicate that the behavior was not recorded for the group in question.

THE NURSERY-SCHOOL RECORD

A sample five-minute record of a nursery-school child's activities during the free play period is reproduced in Fig. 1. Form A represents a threefold classification[22] of the child's behavior according to amount of time spent in three mutually exclusive categories—use of materials, physical activity and no overt activity—recorded, respectively, in the columns labeled M, P, and NO. Active use of material was indicated by a continuous line in the M column; inactive contact with material, by a broken line. Form B shows, in the columns labeled T, PC, L and C,

[22] With the exception of the material category which was intended to furnish the differentiating index of interest in materials, this classification is obviously an arbitrary and artificial one. Its purpose was to give a complete record of the proportionate distribution of the child's time as between material and non-material activities and as between activity and inactivity. No comparisons could be made between the data derived from this record and from the kindergarten Form A record because of differences in the definition of behavior categories.

FIG. 1. SAMPLE FIVE-MINUTE RECORD OF A NURSERY SCHOOL CHILD'S ACTIVITIES DURING THE FREE PLAY PERIOD

Form A

CHILD B TIME 9⁴² – 9⁴⁷ DATE 2/25/30 RECORDER MSF

CHILDREN PRESENT: (A)-(AH)-(B)-(BD)-(D)-(E)-(EB)-(G)-(H)-(I)-(J)-(M)-(MK)-(MM)-(N)-(P)-(PH)-(R)-RB-(V)

Time	M	P	NO	Time	M	P	NO	Time	M	P	NO	Time	M	P	NO
0	Bar			15				30				45			
5				20				35				50			
10				25	MM's Hat			40				55	Hat		
15				30				45				60			
20				35				50	Hat			5			
25				40				55				10			
30				45				60				15	Shovel W. Board		
35				50				5				20	Train		
40				55				10				25			
45				60	Hat			15				30			
50				5				20				35			
55				10				25				40	Bar		
60				15				30				45			
5				20				35	Truck			50			
10				25				40				55			

Form B

CHILD B TIME 9⁴² – 9⁴⁷ DATE 2/25/30 RECORDER REA

CHILDREN PRESENT: (A)-(AH)-(B)-(BD)-(D)-(E)-(EB)-(G)-(H)-(I)-(J)-(M)-(MK)-(MM)-(N)-(P)-(PH)-(R)-RB-(V)

Time	T	PC	L	C	Time	T	PC	L	C	Time	T	PC	L	C	Time	T	PC	L	C
0			✓		15		EB			30			✓		45				
5	✓		✓		20					35			✓		50	✓			
10			✓		25		MM			40			✓		55	Δ			
15					30					45					60				
20	✓		✓		35					50			✓		5				
25					40		(EB)			55	✓		✓		10	✓			
30					45		EB			60	✓				15			✓	
35	✓		✓		50					5	Δ				20				
40		H			55					10			✓		25	✓			
45	✓				60		EB			15	✓		✓		30				
50					5					20					35	✓			
55			✓		10					25					40	✓			
60					15		BD	✓		30			✓		45		N		
5		(H)			20			✓		35	✓		✓		50				
10		(EB)			25		(BD)			40	✓				55				

respectively, the frequency with which talking, physical contact, laughing and crying occurred. These aspects of behavior were recorded in terms of occurrence at least once during a five-second interval.

The following definitions were used in assigning behavior to the several categories:

Materials—all play apparatus and other nursery school equipment, clothing and parts of the building (walls, posts, iron grating, doors, window ledges, etc.).[23]

Use of material—active manipulation of movable objects with hands, feet or other parts of the body, and exploration of, or physical activity evoked by, stationary materials.

Physical activity (exclusive of use of materials)—walking, running, jumping, rolling, crawling, moving up and down in position, waving arms, clapping hands, falling down, etc., and active physical contacts not involving material.

No overt activity—standing, sitting or lying still, making no observable reaction to the environment other than looking around or looking at persons or things.

Talking to persons—using a person's name in direct address, or talking while using the same material as other children or different materials in close proximity to others.[24]

Vocalizing—making audible sounds that had no meaning for the observer.

Physical contact—any direct bodily contact with another person, as in pushing, hitting, striking, embracing, caressing, fighting, or any contact with a person through material, as in confiscation or exchange of toys, having nose wiped or clothes fixed by teacher, taking another child's cap off, etc.[25] No distinction

[23] The definition of what constituted "material" and "use of material" was too comprehensive to be adequately discriminative of individual differences. The revised definitions used in the kindergarten distinguished between activities involving materials on the basis of the function of the activity but not in terms of degrees of activity.

[24] If the observer was uncertain as to whether speech was intended for a particular individual or not, the symbol for speech to a group (π) was used.

[25] An incident was defined as a physical contact through material only when the material was of such a nature as to be handed from child to child, or from child to adult. One exception to this definition was made in the case of the

was made between " friendly " and " unfriendly " physical contacts. It was assumed that the child who pushed and pulled other children at one time would also manifest friendliness through physical contact at another time, that is, that there would be a correlation between the two types of contact in the same individual.

Interpreting the record of Child B for the five-minute period beginning at 9:42 A.M. on February 25, 1930, we see first, by the encircled initials at the top of the record, that nineteen of the twenty children enrolled in the group were present on the roof playground when the record was begun. Form A indicates that Child B was physically inactive, though in contact with material, for brief periods at the beginning and end of the five-minute record. He was engaged in active manipulation of material in all but the first interval of the first minute, for brief periods in the second and third minutes and fairly continuously in the last two minutes. Of the 300 seconds covered by the five-minute period, he spent 165 seconds in use of material, and 60 seconds in physical activity, exclusive of any contact with materials, and was inactive during the remaining 75 seconds. Form B shows that he talked to himself in 14 intervals, talked to a teacher in two intervals, initiated physical contacts with H, EB, MM, BD and N, was the recipient of physical contacts from H, EB and BD, and laughed in 18 intervals.

THE KINDERGARTEN RECORD

A typical five-minute record of the work-period activities of an active kindergarten boy is reproduced in Fig. 2. Form A represents the amount of time spent in functional manipulation of materials involved in the chosen work activity *(Job Material)*; functional manipulation of materials unrelated to the work activity *(Non-Job Material)*; work-related activity not involving actual handling of materials *(Job Self)*; and complete distraction

swing. Actual physical contact with the child in the swing or with the child who tried to take the swing away seemed so inevitable that this activity was included, although taking wagons, doll carriages, trucks, etc., was not, unless an actual body contact occurred.

from work and from concern with materials *(Non-Job Self)*. The *Person* columns of the record which are blank in Fig. 2 were used in recording the child's behavior when he was involved in physical contact and was not at the same time using materials.

FIG. 2. SAMPLE FIVE-MINUTE RECORD OF A KINDERGARTEN CHILD'S ACTIVITIES DURING THE WORK PERIOD

FORM A

Child AP
Date 3/19/34
Time 8:50
Activity Blocks

Int.-Sec.	Non-Job			Job		
	Person	Self	Material	Material	Self	Person
1- 0						
2- 5						
3-10						
4-15						
5-20						
6-25						
7-30						
8-35						
9-40						
10-45						
11-50						
12-55						
	Person	Self	Material	Material	Self	Person
13- 0						
14- 5						
15-10						
16-15						
17-20						
18-25						
19-30						
20-35						
21-40						
22-45						
23-50						
24-55					Sand	
	Person	Self	Material	Material	Self	Person
25- 0						
26- 5						
27-10						
28-15						
29-20						
30-25						
31-30						
32-35						
33-40						
34-45						
35-50						
36-55						
	Person	Self	Material	Material	Self	Person
37- 0						
38- 5						
39-10						
40-15						
41-20						
42-25						
43-30						
44-35						
45-40						
46-45						
47-50						
48-55						
	Person	Self	Material	Material	Self	Person
49- 0						
50- 5						
51-10						
52-15						
53-20						
54-25						
55-30						
56-35						
57-40						
58-45						
59-50						
60-55						

FORM B

Child AP
Date 3/19/34
Time 8:50
Activity Blocks

Int.-Sec.	Language			Physical Contact		
	Job	Non-Job	Indet.	Job	Non-Job	Indet.
1- 0	π					
2- 5	N					
3-10	S					
4-15	CP					
5-20	CP					
6-25						
7-30						
8-35						
9-40		π				
10-45						
11-50						
12-55		R				
	Job	Non-Job	Indet.	Job	Non-Job	Indet.
13- 0		π				
14- 5						
15-10						
16-15						
17-20		RP			Sm	
18-25						
19-30						
20-35	FP			Ppm		
21-40						
22-45	RD			Rpm		
23-50						
24-55						
	Job	Non-Job	Indet.	Job	Non-Job	Indet.
25- 0						
26- 5						
27-10						
28-15	RD					
29-20						
30-25						
31-30						
32-35						
33-40						
34-45						
35-50		✓				
36-55	π					
	Job	Non-Job	Indet.	Job	Non-Job	Indet.
37- 0						
38- 5						
39-10	R					
40-15	R			R		
41-20	R					
42-25						
43-30	π					
44-35						
45-40						
46-45						
47-50						
48-55						
	Job	Non-Job	Indet.	Job	Non-Job	Indet.
49- 0						
50- 5						
51-10						
52-15						
53-20		CP			Cpm	
54-25						
55-30	C					
56-35	π					
57-40				Cm		
58-45	RD			Rpm		
59-50						
60-55						

Such behavior could not legitimately be recorded under *Self*. When physical contacts coincided with use of materials, the *Material* category took precedence. Form B shows the frequency of language and physical contacts, sub-classified according to whether they were related or unrelated to the child's chosen work.[26]

In this record, all behavior was classified as related or unrelated to the child's chosen work or job. The *job* was defined as any approved work activity undertaken by a child or group of children which involved functional use of job materials and resulted in a change in the form or location of the materials. All materials used in the performance of a particular job were considered *job materials*. *Non-job materials* included all furniture, clothing (of the observed child or of others) and all materials not directly related to the child's own work. *Functional* use of materials—recorded under *Job Material* or *Non-Job Material*—was defined as active manipulation or purposive transportation of materials. *Non-functional* uses—recorded under *Job Self* or *Non-Job Self*—included looking at material, holding material for others to see, and feeling, touching or pointing to, material without manipulating it.[27]

Certain changes were made in the recording of language and physical contacts. *Speech addressed to a group* was defined as speech heard by the observer as definitely addressed to more than one person, or accompanied by observation of more than one person, or social vocalization, repetition of words or sounds

[26] See Appendix A for detailed definitions of behavior recorded in each column of Form A and for definition of the *job–non-job* distinction applied to language and physical contact.

[27] Using a pencil, crayon, paint-brush, chalk, etc., to draw pictures or using needles and thread to sew a doll's dress were functional. Twirling a pencil, waving paper in the air aimlessly, fingering cotton wool while waiting for the teacher to return a doll that had been stuffed too full, holding or fondling a doll, even when the work had been defined as sewing a doll's dress, were considered non-functional. If the dress were tried on the doll, however, the use of the doll would become functional. Touching another child's dress was considered a non-functional use of non-job material, but adjusting or otherwise manipulating the dress was a functional use. Pushing a chair up to the table was functional, but supporting the hand on the back of the chair was non-functional.

spoken by others. Physical contacts were differentiated according to whether they were related to the work activity or not, whether they involved material or not, and whether they were initiated or received by the individual observed. Each contact was labeled with the appropriate symbol to indicate whether material was involved, and whether it was a subject, object or subject-object contact. Contacts with persons through material included only those involving manipulation or transportation of the same material by the observed child and others.[28]

Interpreting Form A of Fig. 2, we see that, during the five-minute period beginning at 8:50 on March 19, 1934, AP was engaged in block building until the end of the second minute of the record when he became involved in activity at the sand table (*Job Material* column). For brief periods of a few seconds each in the first, second, fourth and fifth minutes, he was not actually using the blocks or sand but was still showing evidence of concern with his work (*Job Self* column). For equally brief periods in the first and second minutes, he was neither occupied with work nor with materials (*Non-Job Self* column). These distractions represent instances in which the child paused to converse with others or to watch what was going on about him. In the first and second minutes of the record, AP was actively preoccupied with materials which had nothing to do with the work he had chosen (*Non-Job Material* column). Form B shows the social contacts in which AP was involved during the same five-minute period. Being a highly social child, this boy addressed remarks to a group (π) in six of the 60 time intervals and talked to individual children in 15 intervals. His language in interval 35 was non-verbal. He was involved in six mutual physical contacts

[28] Pointing to, or touching, another child's drawing paper when it was lying on the table was not considered a physical contact with the other child, but lifting it, or otherwise manipulating it while the other child was holding it, did count as a contact. Taking a crayon from a box held by another child was not recorded but taking the box out of the other child's hand was considered a contact through material. Holding a valentine in place while another child drew around it or holding a board while another child hammered nails into it were not recorded unless the other child was at the same time manipulating the valentine or board. Casual contacts with a child made by the teacher, such as patting on the head, were arbitrarily omitted.

with other children, all of which were concerned with materials, and was the initiator of a non-material contact with R.

THE FIRST-GRADE RECORD [29]

The first-grade record differed from those taken in the nursery school and kindergarten in that it included only social behavior [30] and contained information concerning social contacts directed toward the observed child by others as well as those initiated by the child himself. While one observer recorded the overt responses of the child to others (Form A), the other noted the responses of others to him (Form B). Further differences between this record and the previous ones consisted in the addition of a third category of social contact, namely, gesture (communication with others by gesture)[31] and a change in the recording of physical contacts.[32] Contacts involving intentional [33] touching of some part of the body of another person (or clothing worn by him) with hands, feet, arms, elbows or other parts of the body or with a material object were distinguished from con-

[29] The same type of record was used in the third grade.

[30] The record differentiating between time spent in active use of materials and time spent in activities not concerned with materials was discontinued with the completion of the kindergarten observations for two reasons. Since the work period did not afford a free choice between social and material activities, the assumption on which the materio-social dichotomy of personality differentiation had been based was no longer valid. In the second place, the amount of time spent in manipulation of materials proved to be a less discriminative index of interest in materials in this situation than had been hoped since choice of materials was not completely free and the index was affected to some extent by the nature of the tasks undertaken.

[31] Since the reliability of the gesture records was not adequately tested, this material has not been analyzed in the present report. The definition of gesture and a list of types of behavior recorded as social gestures are included in Appendix A.

[32] Since the definition of physical contact through material was more inclusive in this record than in the earlier ones, the first-grade data on physical contacts cannot legitimately be compared with the corresponding data for the nursery-school and kindergarten groups.

[33] Accidental physical contacts (those occasioned by accidental spatial proximity to other persons) and contacts involving the use of a person as a means of support (those occasioned by the necessity of maintaining balance, as in getting up from the floor or in passing persons in close quarters) were not recorded.

tacts involving intentional handling of the same material[34] at the same time by the observed child and another person or persons. The former were recorded in the *Physical Contact* column, the latter in the *Material* column. A physical contact was recorded both on Form A and on Form B only when the person contacted responded to the initial contact made by the other person by himself initiating a new contact with that person, *i.e.*, responded by touching, hitting, embracing, etc.[35]

The sample record of a socially active first-grade boy, W, reproduced in Fig. 3, shows the frequency and kind of social contacts initiated by this child (Form A) and the frequency and kind of contacts made with him by others during the same five-minute period (Form B). Form A included speech addressed to other persons; voluntary physical contacts with persons; gestures directed toward persons; and voluntary handling of materials simultaneously with other persons. Form B included speech addressed by others to the observed child; physical contacts initiated by others with the observed child; and gestures directed toward the observed child by others.[36] The simultaneous occurrence of two or more kinds of social contact was indicated by an arrow extending from one column to the other. To distinguish between physical contacts initiated by the observed child and those which represented his responses to contacts initiated by others, a figure 1 was placed above the symbol of the person contacted in the *Physical Contact* or *Material* column of Form A if the observed child made the first overture. If the contact appeared to result from a simultaneous movement on the part of both persons, the contact was labeled *sim*.[37]

[34] The following are examples of the definition of the "same material": blocks fitted together into one object and handled as such, pages and covers of the same book, standard and wheel of the roulette wheel, needle and thread when needle has been threaded, ball of twine and loose end of twine.

[35] An exception to this rule was made in the case of such mutual physical contacts as hand shaking, holding hands, and kissing (not a frequent occurrence). In these instances, it was impossible to tell whether both persons were coöperating, or not, and the contact was included in both records.

[36] Since the *Material* column of Form A included all joint handling of materials by the observed child and another person (the subject-object type of contact), it was unnecessary to use the last column of Form B.

[37] This information has not been used because the reliability of these distinctions was not adequately tested.

Reconstructing the sequence of social events in which this boy was involved during the five-minute period beginning at 8:58 on the morning of February 15, 1935, and interpreting the two records at their face value (that is, assuming that the events

FIG. 3. SAMPLE FIVE-MINUTE RECORD OF THE SOCIAL CONTACTS INITIATED AND RECEIVED BY A FIRST GRADE CHILD DURING THE WORK PERIOD

FORM A

Child W
Date 2/15/35
Time 8:58
Activity Toys

Int.- Sec.	Social Behavior			
	Speech	Phys.Cont.	Gesture	Material
1- 0				
2- 5				
3-10			·	K
4-15				↓
5-20				↓
6-25	MB			
7-30	↓			
8-35	K			
9-40	Ar			
10-45				
11-50	K/MB			
12-55				
	Speech	Phys.Cont.	Gesture	Material
13- 0				
14- 5				MB
15-10		MB	MBst.	↓
16-15			↓	
17-20				
18-25	K→	→	→s	
19-30	↓			K
20-35	↓			↓
21-40				
22-45	MB			
23-50	↓	K		
24-55	↓	K		
	Speech	Phys.Cont.	Gesture	Material
25- 0	MB	MB→	→	→
26- 5				
27-10	K			
28-15	MB	→	→e	
29-20	Ar	Ar		
30-25	MB			
31-30		MB		MB
32-35	MB			
33-40	BG			
34-45				
35-50				
36-55	K			
	Speech	Phys.Cont.	Gesture	Material
37- 0	K→	→		
38- 5	↓			
39-10				
40-15				
41-20	K→	→	→	→sim.
42-25	↓			
43-30	Ar			
44-35				
45-40	Ar			
46-45	↓→	→	→p	
47-50				
48-55	MB→	→	→	↓
	Speech	Phys.Cont.	Gesture	Material
49- 0	↓			
50- 5				
51-10	K→	→	→s	
52-15	↓		↓	
53-20	MB			
54-25	↓→	→		
55-30		↓ K		
56-35	↓	↓ ↓		
57-40				
58-45		↓→	→	→↓
59-50		↓		↓
60-55				

FORM B

Child W
Date 2/15/35
Time 8:58
Activity Toys

Int.- Sec.	Social Behavior			
	Speech	Phys.Cont.	Gesture	Material
1- 0				
2- 5	K			
3-10	↓→	→	→s	
4-15				
5-20	MB			
6-25				
7-30				
8-35	K			
9-40				
10-45				
11-50	MB			
12-55				
	Speech	Phys.Cont.	Gesture	Material
13- 0				
14- 5	MB→	→	→m	
15-10				
16-15	↓			
17-20				
18-25				
19-30		K		
20-35	K			
21-40	MB→	→	→s	
22-45	↓			
23-50				
24-55				
	Speech	Phys.Cont.	Gesture	Material
25- 0	MB			
26- 5	Ar→	→		
27-10	↓			
28-15				
29-20				
30-25				
31-30	MB→	→		
32-35		BG		
33-40			BGs	
34-45				
35-50	MB			
36-55	K→	→	→s	
	Speech	Phys.Cont.	Gesture	Material
37- 0				
38- 5				
39-10				
40-15				
41-20			Ko	
42-25				
43-30	Ar			
44-35	MB			
45-40				
46-45	↓			
47-50				
48-55				
	Speech	Phys.Cont.	Gesture	Material
49- 0	MB			
50- 5				
51-10	↓			
52-15	K			
53-20	MB			
54-25				
55-30				
56-35				
57-40				
58-45		MB		
59-50	MB	↓		
60-55	↓	↓		

actually occurred as timed on the record),[38] we find that the first social contact in which W was involved was initiated by K in the second interval of the first minute of the record (Form B). K spoke to W, touched him and showed him something (symbol s in *Gesture* column). In intervals 3–5 (Form A), the two children handled the same material simultaneously, the contact with the material being made first by K, then by W (the figure 1 beside the vertical line indicating that W was the initiator of the contact). Then MB spoke to W (interval 5, Form B) and W responded (intervals 6–7, Form A). K and W exchanged remarks in interval 8 and in the following interval, W spoke to Ar. In interval 11, W spoke again to K and to MB and was addressed in turn by MB.

In the second minute, the interaction between W and the children K and MB became more complicated. MB spoke and at the same time touched W with a material object (interval 14, Form B). Form A shows that both children were handling the same material and that MB started the material contact. Then W initiated a physical contact with MB and made repeated gestures as if to strike MB (symbol st. in *Gesture* column). To all of this MB responded by speech (interval 16, Form B). W then renewed contact with K, talking to him and showing him something. K meanwhile touched W, spoke to him and took hold of his materials. In the last two intervals of the second minute, W initiated physical contacts with K. MB reëntered the picture in interval 21 (Form B), talking to W and showing something to him, to which W responded by speech.

In the third minute, the social interaction continued with similar intensity, Ar and BG becoming involved. MB emphasized his speech with an accompanying gesture in interval 28

[38] Interpretation of these reciprocal records proved more difficult than had been anticipated because of the possibility of discrepancies in the timing of social contacts by the two observers. We could not assume that records in adjacent intervals on the two records represented an initiation on the part of one child and a response by the other. When contacts with the same person were recorded on both records as beginning in the same interval, there was no way of distinguishing between initiation and response nor could it be assumed that the contacts were simultaneous. Because of this difficulty in relating Form B to Form A, only the latter has been analyzed in the present report.

(symbol e). In the fourth minute (interval 41), K offered something to W (symbol o) and the mutual contact with the object was recorded as a simultaneous movement on the part of the two children *(sim)*. In interval 46, W pointed to something as he spoke to Ar (symbol p). Active interaction with the original children continued unabated until the end of the record.

Sampling Procedure

The selection of a five-minute period as the time sample in the nursery-school study was influenced by the empirical findings of previous studies in the Columbia series. Barker (6) had used a recording interval of five minutes; Beaver (7), a five-minute time sample. Loomis (32) had found a fifteen-minute period too long for practical purposes because of the frequent interruptions occasioned by the nursery-school routine which necessitated the piecing together of segments of records taken on different days and reduced the total number of samples per child to a maximum of eight. By using a relatively short interval, a larger number of children could be observed within the same amount of time, more samples could be obtained for each child, and the samples could be more widely distributed within the total observation period. The five-minute sample was subdivided into five-second intervals [39] in order to obtain the closest possible approximation to the actual number of occurrences of language and physical contact within the limits of accurate recording.[40] The exact duration of an item of behavior lasting less than five seconds was likely to be over- or underestimated by the observer but occurrence within a five-second interval could be reliably determined. A further advantage of this subdivision of the time sample was that it facilitated the identification of specific events

[39] Robinson and Conrad (51) used a four-minute sample subdivided into 16 quarter-minute intervals in measuring talkativeness and social contact. The child's score was the number of quarter-minute periods in which the behavior occurred divided by the total number of quarter-minute periods in which he was observed; that is, the score was equivalent to the per cent of the total intervals in which the behavior was observed.

[40] In Form A of the nursery-school and kindergarten records, the time scale served as an aid to accurate timing of the duration of activities rather than as a measure of frequency of occurrence.

in the comparison of simultaneous records of the same individual's behavior by different observers.

The following precautions were taken to equalize the conditions of observation for all the children studied and to assure as representative a sampling of each child's normal behavior as possible.

(1) No records were taken of a child until he had had ample time to become familiar with the situation in which he was to be observed.[41] If a child was absent for a prolonged period, several days were ordinarily allowed for readjustment to the situation after his return to school.

(2) In order that the presence of the observers might not arouse self-consciousness in the children, thus affecting the "normality" of the behavior observed, observers were instructed to remain aloof from the situation, responding to the children's overtures only in cases of real emergency.

(3) To avoid any distorting effect of time of day or of routine procedures occurring at the beginning or end of the observation period (such as receiving materials from the teacher and putting away materials under the teacher's direction), observations of the different children were rotated in such a way that no child had a disproportionate number of records taken at any one time during the daily observation period. In the nursery school, each child's records were distributed as equally as possible among four half-hour periods. In the later studies, a tally of the number of records taken for each child in each five-minute interval of the daily work period determined the order of observation each day.

(4) No observations of a child were made when any unusual factor in the situation appeared to be influencing his behavior. If, for example, it was known to the observers that a child had recently been disciplined or if some unusual occurrence had upset the customary routine for the child or for the group as a whole, the observation was postponed until a later time. Examples of such variable factors are the presence of a visitor if the child

[41] The public-school children had had from one to five months' experience with the work period before any permanent records were taken. Two of the nursery groups were observed during the second half-year and the children in the third group had been enrolled in the school for at least a month before the regular observations began.

were distracted from his usual activity by it, an accident in the child's immediate vicinity causing a temporary distraction, the demonstration of a rabbit by an older child from another room, etc.

(5) To assure all children an equal opportunity for social activity in the nursery school where the groups were less constant than in the kindergartens and first grades, records were taken only when at least four children were present on the roof playground or in the indoor playroom.[42]

(6) To equalize the opportunity for work for all kindergarten children, no record was begun unless the child was either using work materials or had before him an unfinished job. If a child had completed one job and had not started another when his turn came to be observed, the next child on the list was substituted, and the first child's record was postponed until he had undertaken another job.[43]

(7) To assure independence of the samples, each child's records were distributed as regularly as possible over the entire period of observation, no more than one record being taken on a given day, except when children had been absent and it was necessary to take two records on some days to complete the required number.[44] If a child were less talkative than usual on a particular day because he was not feeling well or had been disciplined at home or in school, the taking of two or more records

[42] In the studies of older children, it was assumed that all children had an equal opportunity for social interaction by virtue of the fact that the number of children present was rarely less than 20 and that the children were free to move about the room if they wished. If a child worked by himself away from other children, it was assumed that he did so by choice rather than necessity. The validity of this assumption is open to question but expediency forbade the introduction of another factor into the already complicated sampling procedure.

[43] If a job was completed during the five-minute observation, however, the record was continued until the end of the period. If the record was interrupted by the teacher's signal to the group to stop all work temporarily, indication was made on the record that an interruption had occurred and the record was begun again in the first interval of the minute in which the distraction had occurred. The child returned to the same job and was probably not seriously influenced by this type of distraction.

[44] When two records were taken on the same day, the observations were spaced as far apart as possible in order that there might not be a correlation between them due to the fact that the child was engaged in the same activity.

on that day would have a greater effect on the total aggregate of samples than if only one observation had been influenced by this variable. If certain materials evoked more social activity than others or if children tended to talk more in the presence of some children than of others, an overweighting of these factors might result from the inclusion in the sample of more than one record taken on the same day.

These sampling rules represented an unconscious, if not a reasoned, attempt to fulfill the conditions of simple sampling, as defined by Yule (**59**) : that the individuals (persons or objects) whose behavior is sampled shall not change during the period of sampling; that the conditions under which samples are taken shall be the same for all individuals compared, that is, that there shall be an equal opportunity for the behavior to occur in all samples; and that each sample shall be independent of every other in the sense that the choice of one sample does not in any way influence the choice of another. The first of these conditions, that there shall be no essential change in the material sampled during the sampling period, seems obvious. This condition would not be satisfied, however, in studies of the sort we are considering, if the total observation period for a child were long enough to include developmental changes in the aspects of behavior sampled. In the studies of kindergarten and first-grade children, it was assumed that no appreciable change would occur in the course of the school year, or the part of it covered by the observations. In the case of the nursery-school children who were undoubtedly changing during the period of observation, we had to assume that the effect of growth changes was relatively uniform for all the children compared. The length of the observation period did not exceed seven months for any child and, for many children, was considerably shorter.

Analysis of the Records

All information concerning social and nonsocial activities was derived from Form B of the nursery-school and kindergarten records and Form A of the first- and third-grade records. In the analysis of language, three categories were distinguished—

speech to other children,[45] speech to adults,[46] and nonsocial speech.[47] The data relative to physical contacts with other children [48] were analyzed in two ways—in terms of all initiated contacts (subject or subject-object) regardless of whether material was used or not [49] and in terms of a sub-classification of these contacts into those involving materials and those not involving materials.[50]

Since all social contacts were recorded in terms of the identity of the individual contacted, it was possible to derive a measure of the range, as well as measures of the frequency, of social contact, namely, the number of different children contacted per uniform time period.[51] By counting the number of different children addressed by a child during each five-minute observation and finding the average number of children addressed per observation (omitting observations in which the child did not talk to other children), a single measure of the extensity or intensity of

[45] *Speech to children* included speech addressed to a group (recorded by the symbol π) and speech addressed to a person when the observer was unable to identify the person addressed (recorded by the symbol X). Reading aloud to another child or in the presence of other children, a frequent activity in the first grade, was excluded.

[46] *Speech to adults* included speech addressed to the regular teachers, to parents, to adult visitors, to the observers and to student teachers.

[47] *Nonsocial speech* included self speech and all forms of vocalization (singing, humming, whistling, etc.) not directed toward other persons. This is obviously a heterogeneous category but it was impossible to distinguish clearly between "talking to self" and other forms of nonsocial vocalization in many instances. It was assumed that the frequency of self speech would be correlated with that of other forms of nonsocial language in the same individual.

[48] Physical contacts with adults were not consistently recorded after the first year of the kindergarten program.

[49] Subject and subject-object contacts were combined into one category for the reason that the nursery-school records did not differentiate between contacts initiated simultaneously by the observed child and another person and those initiated wholly by the observed child. Object contacts, those in which the child made no observable response to a contact initiated by another, have not been analyzed here because they were less reliably recorded and have only an indirect bearing on the social patterns of the children.

[50] The sub-classification is applicable only to the kindergarten, first- and third-grade data since the nursery-school records did not make this distinction.

[51] It was possible to calculate three such measures: the number of children contacted either verbally or physically; the number contacted verbally (number of children addressed); and the number contacted physically. Because of the extreme infrequency of physical contacts, the second of these measures was selected as the most representative index of the range of social contact.

the child's range of verbal social contact comparable for all children was obtained.[52]

The data for each aspect of behavior were analyzed separately without regard to whether other kinds of behavior were recorded in the same five-second interval or not. Thus each occurrence of an event within a five-second interval received a weighting of one. Frequency scores representing the number of intervals in which the behavior occurred were calculated for each five-minute observation and the total scores for each child and for all boys combined and all girls combined were arranged in the form of frequency distributions.[53] The following quantitative measures of frequency and variability were derived from each distribution[54]: the total number of intervals in which the behavior was recorded in all observations combined; the average number of intervals per observation; the standard deviation of the frequency distribution, representing the absolute variability of the frequency scores about the mean of the distribution; and the coefficient of variation,[55] representing the relative variability of each child as compared with other children.

[52] This category included only records of speech recorded as addressed to individual children, *i.e.*, it excluded speech recorded by the symbols π and X.

[53] The individual and group frequency distributions for each category are given in Appendix B.

[54] These indices are given in Appendix C, the tables being designated by the same Roman numeral as the corresponding frequency distribution.

[55] $V=100\frac{\sigma}{M}$.

CHAPTER III

SOCIAL CONTACT PATTERNS

The records of social behavior described in the preceding chapter were designed to reveal age and sex differences in the frequency and distribution of social contacts and individual patterns of involvement in, or withdrawal from, active contact with other persons. To determine the extent to which the first of these objectives had been realized, the combined data for all boys and all girls in each of the four age groups [1] were analyzed from the standpoint of (a) the relative frequency of social and nonsocial language, of speech to children and speech to adults, of speech to boys and speech to girls, and of verbal and physical contacts and (b) the average frequency of speech to children, speech to adults, nonsocial speech, and physical contact with children, and the average number of children addressed, per five-minute observation.

Age Differences in Frequency and Distribution of Social Contacts

The progressive socialization of the young child between the ages of two and six is indicated by the marked increase in the proportion of social language to total language shown in the following summary.[2] The proportion increases from somewhat

[1] The amount of data on which group findings are based varied with the number of children in the group and the number of observations per child as follows:

Group	Number of Children		Number of Observations	Number of Observations per Group	
	Boys	Girls	Per Child	Boys	Girls
Nursery school					
Younger Group	19	17	24	456	408
Older Group	9	11	24	216	264
Kindergarten	26	24	32	832	768
First Grade	14	15	24	336	360

[2] As previously indicated, nonsocial language was not recorded for the first-grade children. In this analysis, intervals in which both social and nonsocial language were recorded were divided between the two categories.

more than a third in the younger nursery group to about two thirds in the older nursery group and more than four fifths of the total in the kindergarten group. Clearly, the tendency is for children to talk more to other people and less to themselves as they grow older. The gradual disappearance of the pattern of talking out loud without regard to the presence of an audience reflects, in part, the normal increase in the acquisition of linguistic

Group		Number of Intervals of Language			% of Total Intervals	
		Social	Nonsocial	Total	Social	Nonsocial
Nursery School						
Younger Group	Boys	2122	3252	5374	39	61
	Girls	1518.5	2683.5	4202	36	64
Older Group	Boys	2180.5	1340.5	3521	62	38
	Girls	2747.5	1261.5	4009	69	31
Kindergarten	Boys	11584.5	2207.5	13792	84	16
	Girls	9044.5	1390.5	10435	87	13

ability; in part, the impact of cultural mores on the child. The two-year-old, in the process of learning to use language, tends to express his thoughts aloud and experiments freely with sounds. Gradually, either through observation of others or through specific training, he learns that it is customary to talk out loud only when one has occasion to communicate with other people. So completely does the pattern of oral self speech drop out with increase in age that a mature person who talks to himself in public

Group		Number of Intervals of Social Language *			% of Total Intervals	
		Speech to Adults	Speech to Children	Total	Speech to Adults	Speech to Children
Nursery School						
Younger Group	Boys	933.5	1188.5	2122	44	56
	Girls	613.5	905	1518.5	40	60
Older Group	Boys	683.5	1497	2180.5	31	69
	Girls	749.5	1998	2747.5	27	73
Kindergarten	Boys	1130.5	10454	11584.5	10	90
	Girls	1398.5	7646	9044.5	15	85
First Grade	Boys	311	6574	6885	5	95
	Girls	248	5170	5418	5	95

* Speech recorded by the symbol π is included in "speech to children"; that recorded by the symbol X is divided between the two categories. Intervals in which speech was addressed both to adults and to children were also evenly divided between the two categories.

attracts attention as an eccentric and is suspected of being either feeble-minded or mentally unbalanced.

While the total amount of social speech increased from youngest to oldest groups, the proportion of speech addressed to adults, as indicated above, decreased from 40 to 44 per cent of the total for the younger nursery group to 5 per cent for the first grade group. The high proportion of speech to adults in the nursery groups is to be expected in view of the fact that the younger children received more physical care at the hands of adults and that, in the normal sequence of development, the child becomes familiar with adults before he acquires ease in social relations with children of his own age.

The subdivision of speech to children (exclusive of that recorded by the symbols π and X) into speech addressed to boys and speech addressed to girls, summarized below, showed that, in all except the younger group of nursery-school girls, boys talked predominantly to boys and girls to girls. The deviation of the

Group		Number of Intervals of Speech to Children			% of Total Intervals	
		Speech to Boys	Speech to Girls	Total	Speech to Boys	Speech to Girls
Nursery School						
Younger Group	Boys	663	316.5	979.5	68	32
	Girls	382.5	267.5	650	59	41
Older Group	Boys	738.5	553	1291.5	57	43
	Girls	692	1030.5	1722.5	40	60
Kindergarten	Boys	7437.5	1694	9131.5	81	19
	Girls	1665	5167	6832	24	76
First Grade	Boys	4679	1267.5	5946.5	79	21
	Girls	982	3807	4789	21	79

younger nursery girls from the general trend is explained by the fact that Nursery School Group II was composed of 10 boys and 7 girls and that the two girls who talked most to other children talked more often to boys than to girls. The predominance of speech to children of the same sex is especially marked in the kindergarten and first-grade groups. These findings conform in general with results reported in related studies of companionships and spontaneous groupings of young children. Challman (16),

in a study of preschool friendships based on records of the names of children involved in more than 7,000 spontaneous play groups, found a tendency for all children, even the youngest, to discriminate on the basis of like sex. Hagman (26), found "no decided preference for like sex or unlike sex companions" in a group of 15 two-year-old children but "a significant tendency to choose as companions individuals of their own sex rather than those of the opposite sex" in a group of 24 four-year-old children. Chevaleva-Janovskaja (17), summarizing the results of teachers' observations of some 2,000 spontaneous groups formed by Russian children ranging in age from three to eight years, reports that 67 per cent of the groups observed were composed of children of the same sex and concludes that preschool children prefer unisexual to bisexual groups. The tendency to form unisexual groups was found to increase with age, children aged three to five forming bisexual groups more often than the older children.

The analysis of all social contacts by type of contact showed that the verbal type predominated over the physical in all groups; the children communicated with one another through speech more often than through physical contact. Verbal contacts repre-

Group		Number of Intervals of Social Contact			% of Total Intervals	
		Verbal	Physical	Total	Verbal	Physical
Nursery School						
Younger Group	Boys	1134	706	1840	62	38
	Girls	877.5	525.5	1403	63	37
Older Group	Boys	1490.5	312.5	1803	83	17
	Girls	1962.5	327.5	2290	86	14
Kindergarten	Boys	10295.5	1289.5	11585	89	11
	Girls	7500	837	8337	90	10
First Grade	Boys	6531	1149	7680	85	15
	Girls	5287.5	694.5	5982	88	12

sented 83 per cent or more of the total amount of social contact in all except the younger nursery group. Somewhat more than a third of the social contacts of the youngest children were of the physical type and eleven children had a higher proportion of physical than of verbal contacts.[3] The more important rôle of

[3] Table X (Appendix B).

physical contact as a means of communication with other persons in the social interaction of very young children is explained in part by the young child's lack of facility in the use of language. A further explanation lies in the fact that the young child, in the process of trial and error experimentation with his environment, tends to apply the same techniques to human beings as to inanimate objects. If left free to follow his natural inclinations, he may go about knocking other children down to see what happens, just as he throws toys on the ground or pushes them away from him in the process of finding out how material objects behave.

SPEECH TO CHILDREN

The average frequency of speech to other children per five-minute observation—number of five-second intervals per 60 in which speech to children occurred—increased from each age group to the next higher one (Table 1). For boys, the means increase from 2.61 to 6.96 to 12.76 to 19.57; for girls, from 2.22 to 7.59 to 10.06 to 14.37. In the younger nursery group, children talked to other children in about 4 per cent of the total time they were observed; in the older nursery group, in 12 per cent; in the kindergarten group, in 22 per cent and 17 per cent for boys and girls respectively; and in the first-grade group, in 33 per cent and 23 per cent respectively, for boys and girls.[4] Since the differences between the means of the paired age groups are all at least four times as great as the standard error of the difference and the groups were observed under highly comparable conditions, we can safely assume that these are genuine age differences.[5]

[4] While the general fact of increase in social language with age during the preschool period is reported in many studies of language and social behavior in young children, it is impossible to relate the findings of the present investigation concerning amount of social speech at different ages to those of other related studies because of differences in method of recording language frequency. Olson and Koetzle (**44**) report results as to amount of talking in young children in terms of the average number of words spoken by children in a senior nursery group and a kindergarten group in thirty one-minute observation periods; Fisher (**19**), in terms of the average number of remarks per hour.

[5] The size of the difference between kindergarten and first-grade groups may have been affected somewhat by the fact that 15 of the first-grade children were observed under conditions of greater freedom than any of the kindergarten groups and by differences between observers in amount of language recorded. The latter point is discussed in Chapter VI.

TABLE 1

AGE DIFFERENCES IN MEAN FREQUENCY OF BEHAVIOR PER FIVE-MINUTE OBSERVATION PERIOD *

Behavior	Sex Group	Mean: Younger Nursery	Mean: Older Nursery	σ: Younger Nursery	σ: Older Nursery	Difference between Means	σ Difference	Difference / σ Difference
Speech to Children	Boys	2.61	6.96	3.72	7.27	4.35	.52	8.37
	Girls	2.22	7.59	3.80	7.52	5.37	.50	10.74
Speech to Adults	Boys	2.05	3.18	3.94	4.04	1.13	.32	3.53
	Girls	1.51	2.85	2.73	3.95	1.34	.28	4.79
Nonsocial Speech	Boys	7.13	6.24	8.09	7.28	.89	.62	1.44
	Girls	6.58	4.80	8.20	6.28	1.78	.55	3.24
Physical Contact with Children	Boys	1.71	1.71	3.03	3.18	0	0	0
	Girls	1.38	1.56	2.87	3.06	.18	.24	.75
Number of Children Addressed †	Boys	1.46	1.87	.75	.98	.41	.07	5.86
	Girls	1.46	1.95	.68	.98	.49	.07	7.00
		Older Nursery	Kindergarten	Older Nursery	Kindergarten			
Speech to Children	Boys	6.96	12.76	7.27	10.14	5.80	.60	9.67
	Girls	7.59	10.06	7.52	9.78	2.47	.58	4.26
Speech to Adults	Boys	3.18	1.22	4.04	2.53	1.96	.28	7.00
	Girls	2.85	1.74	3.95	3.17	1.11	.26	4.27

TABLE 1—*Continued*

Behavior	Sex Group	Mean		σ		Difference between Means	σ Difference	Difference / σ Difference
		Older Nursery	Kindergarten	Older Nursery	Kindergarten			
Nonsocial Speech	Boys	6.24	2.77	7.28	5.96	3.47	.54	6.43
	Girls	4.80	1.83	6.28	4.81	2.97	.41	7.24
Physical Contact with Children	Boys	1.71	2.01	3.18	2.81	.30	.24	1.25
	Girls	1.56	1.43	3.06	2.74	.13	.21	.62
Number of Children Addressed †	Boys	1.87	2.62	.98	1.51	.75	.08	9.37
	Girls	1.95	2.03	.98	1.08	.08	.07	1.14
		Kindergarten	First Grade	Kindergarten	First Grade			
Speech to Children	Boys	12.76	19.57	10.14	11.91	6.81	.74	9.20
	Girls	10.06	14.37	9.78	10.61	4.31	.66	6.53
Speech to Adults	Boys	1.22	.94	2.53	2.18	.28	.15	1.87
	Girls	1.74	.69	3.17	1.75	1.05	.14	7.50
Number of Children Addressed †	Boys	2.62	3.06	1.51	1.60	.44	.10	4.40
	Girls	2.03	2.91	1.08	1.56	.88	.10	8.80

* "Mean frequency" is the average number of five-second intervals per 60 in which the behavior occurred.
† For this category, means and standard deviations are based on the number of observations in which speech to children occurred.

The increase in frequency of speech to other children from youngest to oldest groups is shown graphically in Figures 4 and 5. Fig. 4 shows the percentage distributions of all observations of boys in the four age groups according to the frequency

FIG. 4. SPEECH TO CHILDREN: PERCENTAGE DISTRIBUTIONS OF ALL FIVE-MINUTE OBSERVATIONS OF BOYS BY FREQUENCY SCORE PER OBSERVATION

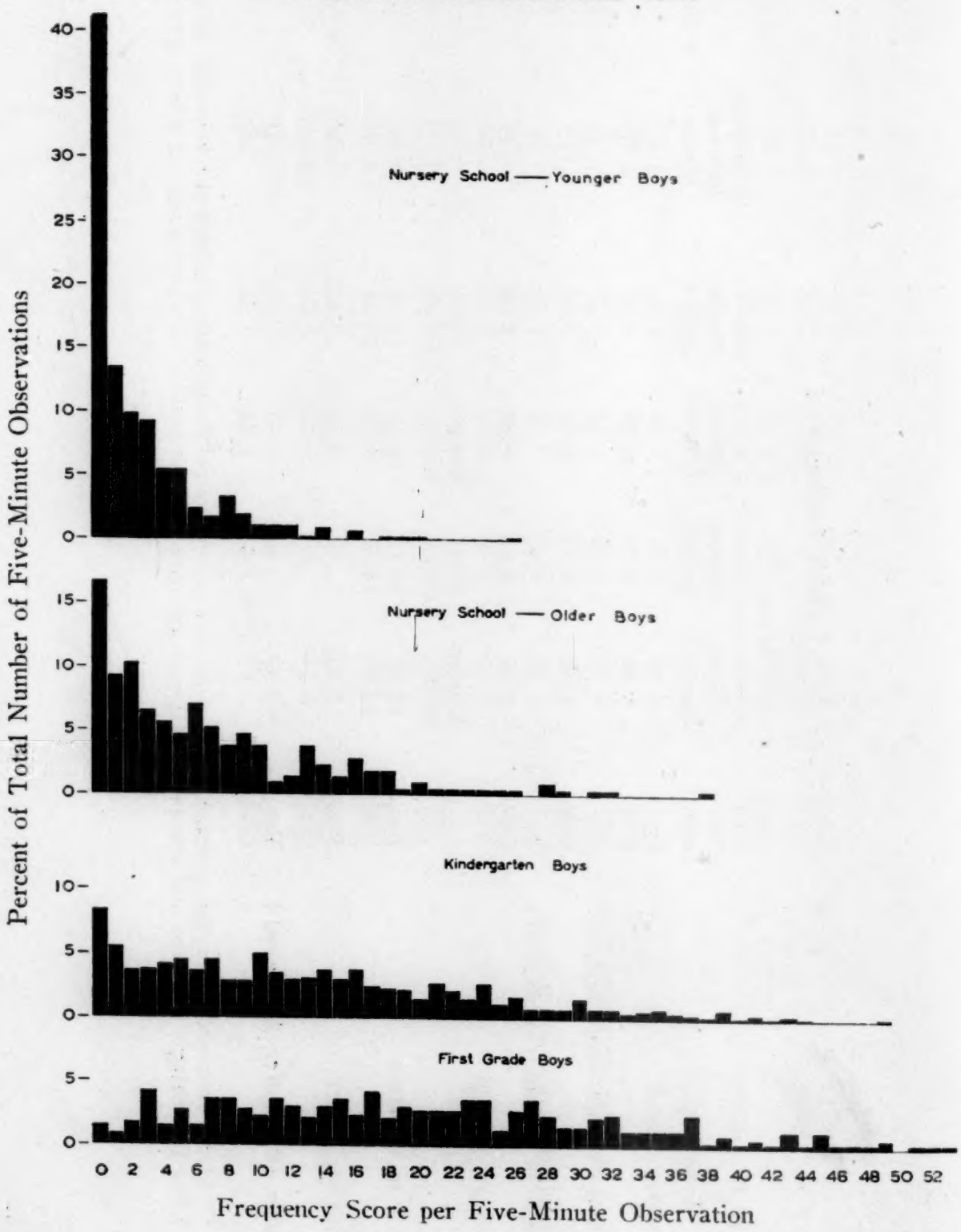
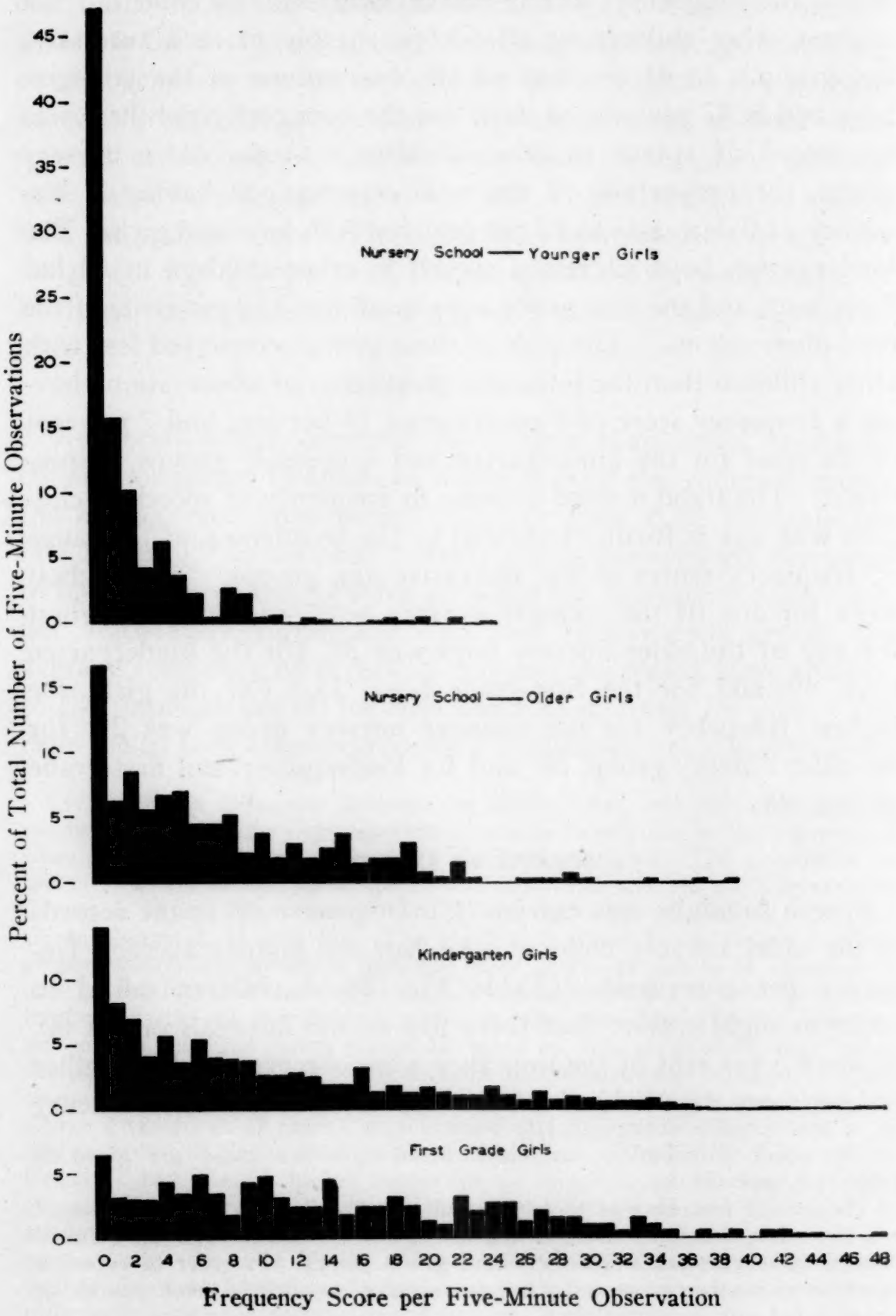


FIG. 5. SPEECH TO CHILDREN: PERCENTAGE DISTRIBUTIONS OF ALL FIVE-MINUTE OBSERVATIONS OF GIRLS BY FREQUENCY SCORE PER OBSERVATION



score per observation; Fig. 5, the corresponding distributions for the girls.[6] The per cent of the total number of observations in which the frequency was 0—those in which the child did not address other children at all—drops sharply in each successive age group. In 41 per cent of all observations of the youngest boys and in 47 per cent of those for the youngest girls, there was no record of speech to other children. In the older nursery group, the proportion of the total observations having a frequency of 0 decreases to 17 per cent for both boys and girls. The kindergarten boys addressed speech to other children in all but 8 per cent, and the first grade boys in all but 1½ per cent, of the total observations. The girls in these groups conversed less with other children than the boys, the proportion of observations having a frequency score of 0 constituting 14 per cent and 7 per cent of the total for the kindergarten and first-grade groups, respectively. The trend toward increase in frequency of speech to children with age is further indicated by the broadening of the range of frequency scores in the successive age groups. The highest score for any of the younger nursery boys was 26, the highest for any of the older nursery boys was 38, for the kindergarten boys, 49, and for the first-grade boys, 53. For the girls, the highest frequency for the younger nursery group was 24, for the older nursery group, 38, and for kindergarten and first-grade groups, 48.

SPEECH TO ADULTS

Speech to adults was extremely infrequent even in the records of the older nursery children who had the highest average frequency per observation (Table 1). These children talked to adults in slightly more than three five-second intervals out of 60, or about 5 per cent of the time they were observed.[7] In all other groups, more than half of the total observations had a frequency

[6] The group distributions on which percentages are based are given in Table II (Appendix B).

[7] The greater frequency of speech to adults in this group is perhaps explained by a more frequent involvement of the teachers in the activities of the children through the suggestion and direction of group games. In order to complete the required number of records, it was necessary to include some periods of semi-directed activity of this sort.

score of 0. The mean frequency of speech to adults increased from the younger to the older nursery group, decreased from the older nursery to the kindergarten, and again from the kindergarten to the first-grade group.[8] Although the average frequency of this behavior was greater for the older than for the younger nursery group, the proportion of speech to adults to total social speech, as already indicated, was less. The older children were more voluble, talking more both to children and to adults, than the younger ones. The differences between the averages for the paired age groups, with the exception of the comparison of kindergarten and first-grade boys, were all statistically significant.

NONSOCIAL SPEECH

Nonsocial speech occurred more often than either speech to children or speech to adults in the records of the youngest group, the average for boys being 7.13, for girls 6.58 intervals per 60 (Table 1). In the older nursery group, the averages decreased to 6.24 for boys and 4.80 for girls but the decrease for boys was not statistically significant. In the kindergarten group, the average frequency of nonsocial language decreased more sharply, to 2.77 intervals per 60 for boys and 1.83 intervals for girls. The decrease in both cases represents a statistically reliable difference.

[8] Whether the difference between the kindergarten and first-grade groups can be attributed to developmental changes or is largely due to the influence of situational factors is not clear from the data available. The proportion of speech to adults to total social speech was 10%, 16% and 7% for Kindergarten Groups I, II and III, respectively; 2%, 5% and 10%, respectively, for First Grade Groups I, II and III. The children in First Grade Group I talked proportionately less to adults than any other group, as was to be expected, in view of the fact that the teacher made a special effort not to become involved in the activities of the children while records were being taken. The low percentages for First Grade Group II, based on only seven cases, may reflect the teacher-child relationship characteristic of the particular situation in which observations were made, or, taken in combination with the low figure for Group I (based on 15 cases), may indicate that first-grade children tend to be less dependent on adults than kindergarten children. The girls in Kindergarten Group II had a much higher proportion of speech to adults than any other group. The differences between Kindergarten Groups II and III are to be attributed to individual differences in the children since the situation and the teachers were the same for the two groups. Clearly, these percentages, based as they are on very small numbers of cases, afford no conclusive evidence of age differences between kindergarten and first-grade children.

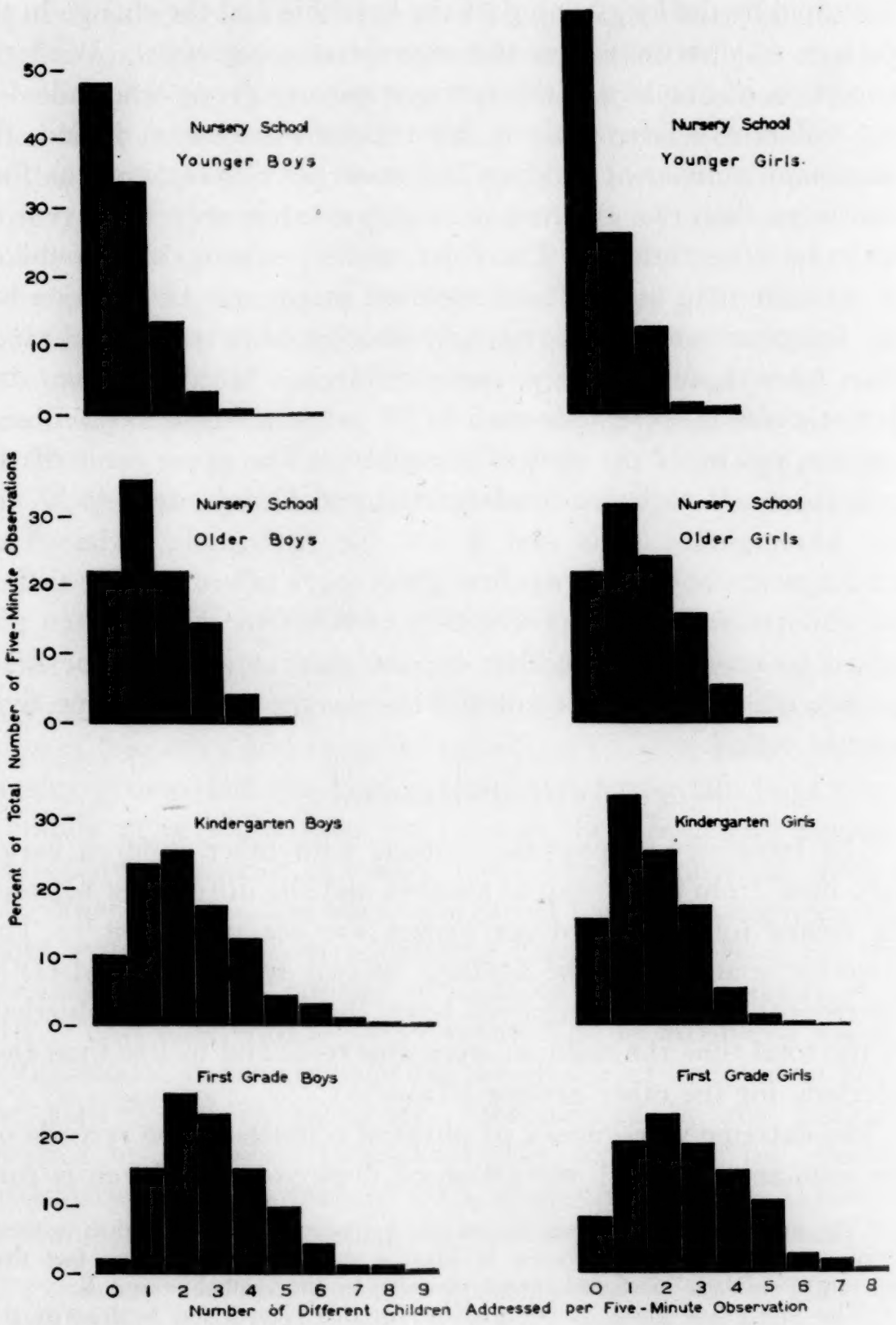
NUMBER OF CHILDREN ADDRESSED

The average number of children addressed per observation, based only on observations in which talking to children occurred, increases in the four groups of boys from 1.46 to 1.87 to 2.62 to 3.06 and in the girls' groups, from 1.46 to 1.95 to 2.03 to 2.91. All but one of the differences between the means of the paired age groups—that between the older nursery school girls and the kindergarten girls—are statistically significant, being four or more times as great as the standard error of the difference (Table 1). To interpret this consistent increase from youngest to oldest groups categorically as evidence of a developmental trend toward a broadening of the range of social contact with age, it would be necessary to rule out the possibility that the measures were affected by consistent situational differences in number of persons present. The number of persons addressed should, in other words, be related to the number of persons available to be addressed. Since the kindergarten and first-grade records did not include the necessary information as to number of persons present, however, it was impossible to explore this point. Part of the increase noted is undoubtedly attributable to the increase in social talkativeness characteristic of the preschool and early school period.

The percentage distributions of all observations per age-sex group[9] by number of children addressed per observation are shown in Fig. 6. In 48 per cent of all observations of the younger nursery boys and in 59 per cent of all observations of the younger nursery girls, the frequency score was 0, indicating that no speech was addressed to individual children. The percentage of observations having a 0 frequency drops to 22 per cent, 10 per cent and 2 per cent for the older nursery, kindergarten and first-grade boys, respectively; to 22 per cent, 16 per cent and 8 per cent, respectively, for the older nursery, kindergarten and first-grade

[9] The group distributions on which percentages are based are given in Table IV (Appendix B).

FIG. 6. NUMBER OF CHILDREN ADDRESSED: PERCENTAGE DISTRIBUTIONS OF ALL FIVE-MINUTE OBSERVATIONS



girls.[10] The increase in the number of different children addressed per observation from youngest to oldest groups is also indicated by the lengthening of the base line and the change in the pattern of distribution in the successive age groups. With the exception of one boy in the younger nursery group who talked to six different children in one five-minute observation period, the maximum number of children addressed per observation was four and more than two children were addressed in only 4 per cent of the total observations. The older nursery-school children talked to no more than five different children in any one observation but the frequencies are more regularly distributed over the total range than were those for the younger children. More than two different children were addressed in 20 per cent of the boys' observations and in 22 per cent of the girls'. The upper limit of the range extends to 9 for kindergarten and first-grade boys, 7 for the kindergarten girls and 8 for the first-grade girls. Two kindergarten boys and two first-grade boys talked to nine different children in a single observation each. One kindergarten girl talked to seven other children in one observation and one first-grade girl, to eight different children in the course of one five-minute period.

PHYSICAL CONTACT

The frequency of physical contacts with other children varies very little from one group to another and the differences between the means for the paired age groups are not significant.[11] The behavior occurred, on the average, in two intervals out of 60 in the records of the kindergarten boys, that is, in about a thirtieth of the total time the children were observed, and in less than two intervals for the other groups (Table 1).

The extreme infrequency of physical contacts in the records of the spontaneous social interaction of these young children is fur-

[10] The proportion of observations having a frequency of 0 is higher in these distributions than in those shown in Figs. 4 and 5 because of the fact that "speech to children" included speech recorded by the symbols π and X.

[11] The first-grade group is not included in this comparison because of the more inclusive definition of physical contact used in the final year of the investigation and the situational difference (the lack of a work requirement in School A) affecting the first-grade data.

ther demonstrated by the percentage distributions [12] of all observations for nursery-school and kindergarten children shown in Fig. 7. In more than 50 per cent of the total observations for all girls and for the nursery-school boys, and in 42 per cent of the observations of kindergarten boys, no physical contacts with other children were recorded. Three extreme scores have been omitted from the distributions in Fig. 7, a score of 26 (younger nursery girls), one of 28 (older nursery boys) and one of 41 (kindergarten girls). With the exception of these high frequencies, the highest score for boys was 19, for girls, 22. It is clear that, even when broadly defined to include exchange of materials and joint use of materials with others, physical contacts were extremely rare. The interesting point is that the distributions are practically identical for the different age groups, that is, that the incidence of the behavior neither increases nor decreases with age.

Sex Differences in Frequency of Behavior

Sex differences in the average frequency of language and physical contact are shown in Table 2. No significant differences in frequency and range of social contact were noted for the nursery groups but the kindergarten and first-grade boys were definitely more social than the girls in their respective groups. They conversed more and were more often in physical contact with other children, and the kindergarten boys had a significantly wider range of contact, addressing their conversation, on the average, to a larger number of children than the kindergarten girls. This difference is too pronounced to be attributed wholly to situational factors influencing the choice of activity by boys and girls [13] and is, moreover, substantiated by the findings reported by Chevaleva-Janovskaja (17) concerning the greater participation of boys than of girls in group activity. Although the number of girls exceeded the number of boys in the schools

[12] Percentages are based on the group distributions shown in Table III (Appendix B).

[13] In the kindergarten, boys worked on group projects (block-building, work at the sand table, etc.) more often than girls. Choice of activity may have been influenced to some extent by suggestions from the teachers.

FIG. 7. PHYSICAL CONTACT WITH CHILDREN: PERCENTAGE DISTRIBUTIONS OF ALL FIVE-MINUTE OBSERVATIONS BY FREQUENCY SCORE PER OBSERVATION

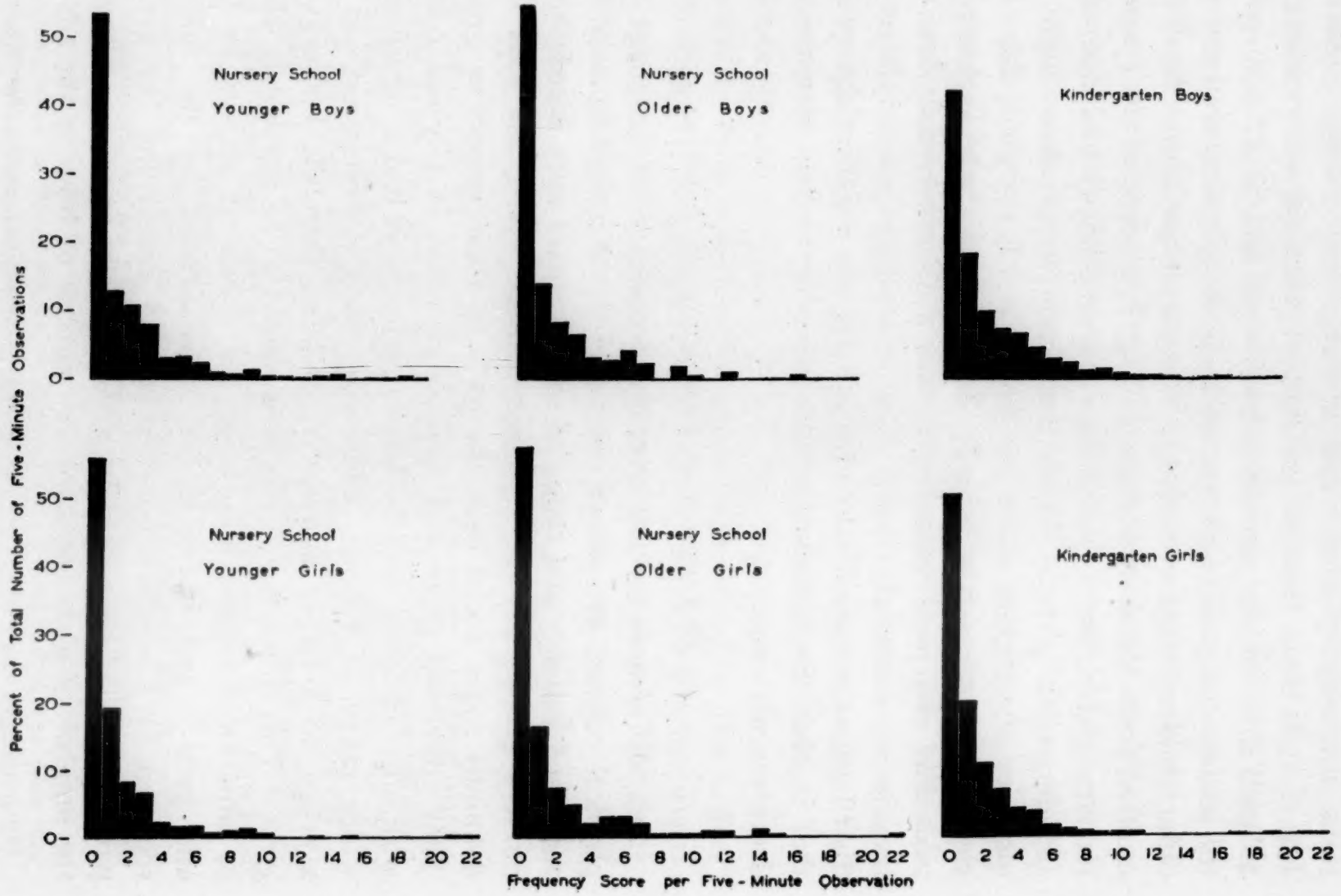


TABLE 2

SEX DIFFERENCES IN MEAN FREQUENCY OF BEHAVIOR PER FIVE-MINUTE OBSERVATION PERIOD*

Behavior	Age Group	Mean		σ		Difference between Means	σ Difference	Difference / σ Difference
		Boys	Girls	Boys	Girls			
Speech to Children	Younger Nursery	2.61	2.22	3.72	3.80	.39	.25	1.56
	Older Nursery	6.96	7.59	7.27	7.52	.63	.67	.94
	Kindergarten	12.76	10.06	10.14	9.78	2.70	.49	5.51
	First Grade	19.57	14.37	11.91	10.61	5.20	.86	6.05
Speech to Adults	Younger Nursery	2.05	1.51	3.94	2.73	.54	.23	2.35
	Older Nursery	3.18	2.85	4.04	3.95	.33	.36	.92
	Kindergarten	1.22	1.74	2.53	3.17	.52	.14	3.71
	First Grade	.94	.69	2.18	1.75	.25	.15	1.67
Nonsocial Speech	Younger Nursery	7.13	6.58	8.09	8.20	.55	.56	.98
	Older Nursery	6.24	4.80	7.28	6.28	1.44	.63	2.29
	Kindergarten	2.77	1.83	5.96	4.81	.94	.27	3.48
Physical Contact with Children	Younger Nursery	1.71	1.38	3.03	2.87	.33	.20	1.65
	Older Nursery	1.71	1.56	3.18	3.06	.15	.29	.52
	Kindergarten	2.01	1.43	2.81	2.74	.58	.14	4.14
	First Grade	5.12	2.71	6.37	3.58	2.41	.39	6.18
Number of Children Addressed†	Younger Nursery	1.46	1.46	.75	.68	0	0	0
	Older Nursery	1.87	1.95	.98	.98	.08	.09	.89
	Kindergarten	2.62	2.03	1.51	1.08	.59	.06	9.83
	First Grade	3.06	2.91	1.60	1.56	.15	.12	1.25

* "Mean frequency" is the average number of five-second intervals per 60 in which the behavior occurred.
† For this category, means and standard deviations are based on the number of observations in which speech to children occurred.

where observations were made in this study, 68 per cent of the boys participated in spontaneously formed groups as compared with 56 per cent of the girls and the average number of instances of group participation, based on 3,438 observations of 276 children was 13.00 for boys and 11.76 for girls.

The sex differences in frequency of nonsocial language for the older nursery and kindergarten groups and in frequency of speech to adults for the younger nursery and kindergarten children were also statistically significant. The higher frequency of nonsocial speech for the older nursery and kindergarten boys and of speech to adults for the younger nursery boys is probably due to the fact that the boys were more talkative than the girls in these groups. The kindergarten girls worked on individual projects more than the boys and tended to consult the teachers more often about their work.

Individual Patterns

In the following discussion of individual patterns, it has been assumed that the most social child is the one who is most often involved in social contact and who distributes his contacts most widely among the members of his group; that, conversely, the child who is least often involved in social contact and who has the narrowest range of contact is the least social. Because of the infrequency of physical contacts, the frequency of speech addressed to children [14] has been considered the most important single measure of the degree of involvement in social contact. Since speech is generally recognized to be the most frequently occurring mode of communication with other persons, it would seem to be the best index of interest in persons or of sociability.[15]

[14] Speech to adults, in this study, was dependent to a large extent upon the requirements of the situation. Children talked to the teacher for the most part only when they needed help with their work or when the teacher approached them to offer suggestions concerning their work or to administer discipline. Since conversations between child and adult did not ordinarily represent the same sort of spontaneous interchange as that between one child and another, the frequency of speech to adults was not a highly discriminative measure of social tendency.

[15] While frequency of speech to children was probably the most satisfactory index for most children, it might, in some instances, be an unfair measure of sociability, as in the case of a foreign-born child observed in a school group before he has had a chance to acquire the new language.

The average number of different children addressed per observation and the distribution of verbal contacts among the different members of the social group have been used as indices of the intensiveness or extensiveness of the range of social contact.[16]

With a view to distinguishing characteristic individual patterns of social contact, the following indices were computed:

(1) the average frequency, per five-minute observation, of social contact with children (irrespective of the type of contact), speech to children, speech to adults, nonsocial speech and voluntary physical contact with children.

(2) the average number of different children addressed per observation.

(3) the percentage distribution of all language among the three categories: *Speech to Children, Speech to Adults* and *Nonsocial Speech* (for nursery-school and kindergarten children).

(4) the percentage distribution of all social contacts by type (verbal or physical).

(5) the maximum per cent of speech addressed to any one child (for kindergarten group only).

These indices are discussed with reference to the kindergarten children, the group for which the largest number of observations was obtained and the sampling conditions were most satisfactory.[17]

Considering first individual differences in amount of social contact,[18] we find, at one extreme, three boys (M 47, M 60 and M 84) and one girl (F 83) who either talked to other children or were in physical contact with children in more than a third of the total time they were observed—in 21 or more intervals out

[16] The discriminative value of the range of social contact has been suggested by various investigators. Heidbreder (27) found the most significant index of extroversion-introversion to be a question as to whether a person's acquaintance was limited to a few intimate friends. Stauter and Hunting (52) devised an acquaintanceship questionnaire to be used as a test of sociability. Komarovsky (31), working with D. S. Thomas, studied the territorial distribution as well as the number and type of social contacts in various adult groups by means of a questionnaire requesting information concerning visits made, letters written and received, telephone calls, etc.

[17] The corresponding data for the nursery-school and first-grade children are included in Appendix C + B

[18] Table I A (Appendix C). The measures of frequency for this category vary only slightly from those for "speech to children" for the reason that the predominant proportion of social contacts was verbal.

of every 60.[19] The group average for boys was 13.92, for girls, 10.86. At the other extreme, we find a boy (M 82) and a girl (F 75) who were in contact with other children in less than three intervals out of 60, which is even less than the average for the younger nursery group. F 75 had no verbal or physical contacts at all in 21 of her 32 observations and, in eight of the remaining observations, was in contact with other children in no more than five intervals. M 82, in 13 of his 32 observations, was not involved in social contact at all, and, in 14 more observations, had frequency scores of only 1, 2, 3 or 5 intervals out of a possible 60.[20]

Despite the infrequency of physical contacts and the predominance of the verbal over the physical type of contact in the patterns of all the kindergarten children, the degree of involvement in physical contact varies considerably from child to child. Examining the combined measure including both contacts involving materials and those not involving materials,[21] we find that five boys and seven girls had an average frequency of less than one interval out of 60, indicating that they scarcely became involved in physical contact at all. In contrast with these children are others who manifested the behavior, on an average, in three or four intervals out of 60. Non-material contacts were less frequent than those involving materials, occurring in less than one interval per 60 for 29 of the 50 children. The high average for F 47 is due to one observation in which this child had a prolonged contact with F 83.[22] Some children, as, for example, M 47 and M 36, have relatively few non-material contacts but have high averages for contacts involving materials. M 60 and M 64 have high averages for both types of contact.

[19] Identifying symbols have been substituted for the initials used in the original records. Numbers based on chronological age order within each situational group were assigned to all children, those not observed as well as those included in the observed groups.

[20] Table I (Appendix B).

[21] Table III A (Appendix C).

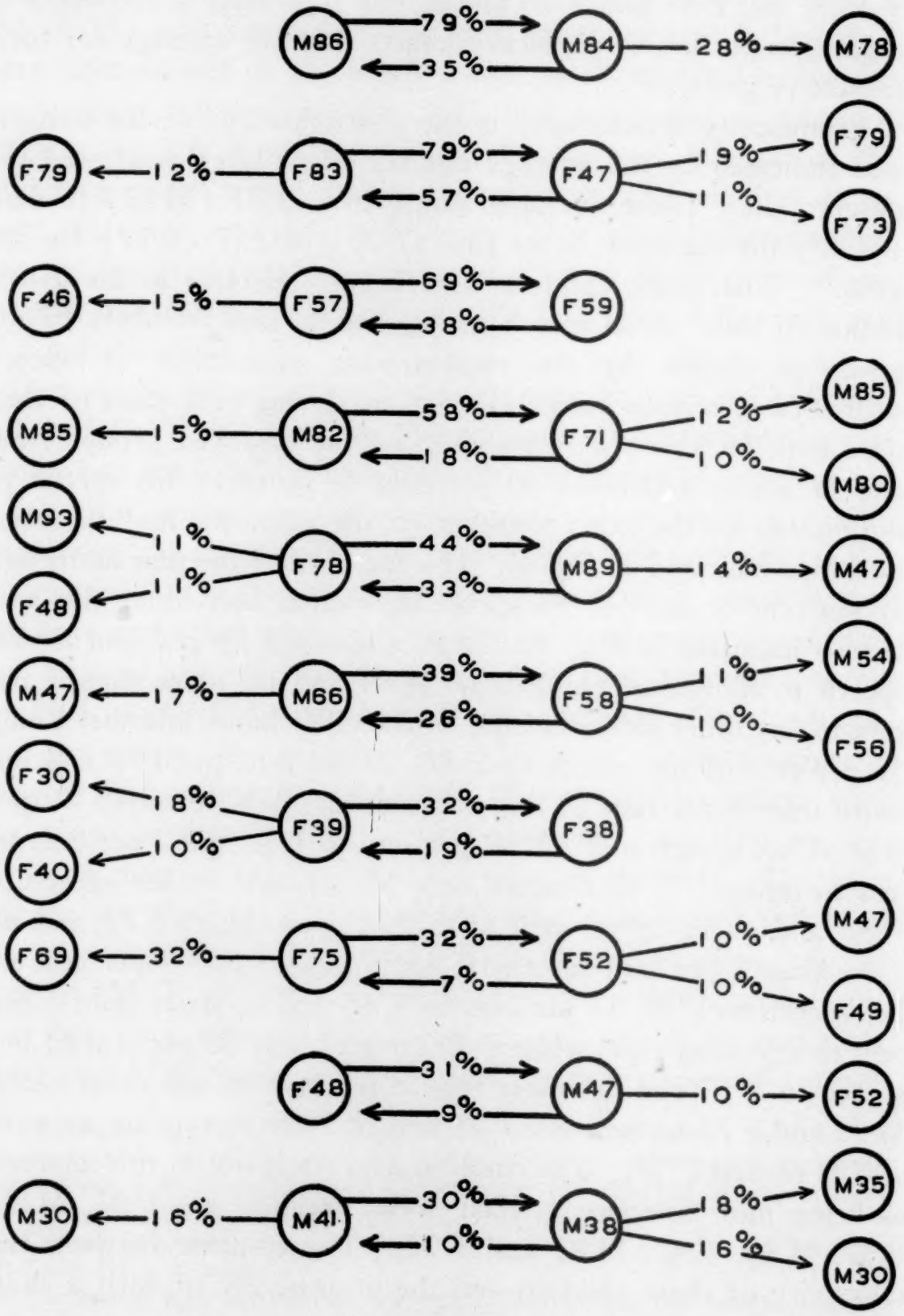
[22] The record does not indicate the type of contact but this was presumably an instance in which the two children were walking about with their arms about each other or hand in hand. This type of contact rarely occurred because of the work requirement but might occur if the child completed his work during the five-minute observation and did not immediately undertake another task.

M 63, M 64, M 58, M 56, and M 82 among the boys, and F 62, F 48, F 51, F 47 and F 56 among the girls have a considerably higher proportion of physical contacts than the average for their respective groups.[23]

Promiscuity or selectivity in the distribution of verbal contacts was indicated by the average number of children addressed per observation. These averages range from 1.31 (M 82) to 4.28 (M 47) for the boys; from 1.67 (F 75) to 2.77 (F 77) for the girls.[24] That some children were highly selective in the distribution of their social speech among the various members of the group is shown by the predominant proportion of speech addressed to certain individuals. Considering only pairs of children both of whom were members of the observed group [25] and one of whom addressed 30 per cent or more of his *speech to individuals* to the other member of the pair, we find the relationships indicated in Fig. 8. If a member of the pair addressed 10 per cent or more of his speech to another individual, this fact is also indicated in Fig. 8. M 86 addressed 79 per cent of his speech to individual children to M 84 and no more than 5 per cent to any other child. M 84, on the other hand, addressed only 35 per cent of his speech to M 86, 28 per cent to M 78 and not more than 6 per cent to any other child. F 83 directed 79 per cent of her speech to F 47, 12 per cent to F 79 and 2 per cent or less to others. F 47 directed only 57 per cent of her speech to F 83, addressing 19 per cent to F 79, 11 per cent to F 73, and no more than 2 per cent to others. F 57 addressed 69 per cent of her speech to F 59, 15 per cent to F 46 and no more than 5 per cent to any other child while F 59 directed only 38 per cent of her speech to F 57 and not more than 8 per cent to any other child. M 82 and F 71 were twins, F 78 and M 89 were cousins, as were also M 66 and F 58. The children who stand out in this analysis as being most selective in their social contacts are F 83, M 86, F 57, M 84, F 47, M 82 and F 75. The contrast between the selectivity of these children and the promiscuity of such a child

[23] Table X (Appendix B).
[24] Table IV A (Appendix C).
[25] M 43 addressed 70% of his speech to two boys not included in the observed group and F 56, 74% of hers to two children who were not observed.

FIG. 8. RECIPROCAL PATTERNS IN SPEECH CONTACTS



Circles in the second column indicate children who addressed 30% or more of their speech to children to those specified in the third column. Circles in the first and fourth columns represent other children to whom the children in the second and third columns addressed at least 10% of their speech.

as M 47 is striking. This highly social boy addressed no more than 10 per cent of his speech to individual children to any one child, distributing his speech among 37 different children.

Individual patterns also appear in the relative frequency with which the children talked to adults and to children.[26] While the proportion of speech to adults—speech to the teacher in the kindergarten study—to total language was only 7 per cent for all boys, seven boys (M 41, M 38, M 82, M 61, M 54, M 89 and M 64) directed as much as 12–27 per cent of their speech to the teachers. A few girls deviate widely from the group average of 13 per cent. F 60 addressed 44 per cent of her language to the teacher, a fact which is explained in part by her late entrance into the group. A third or more of the total language of F 50, F 58 and F 48 was addressed to the teachers. A few children deviate widely from the general tendency to talk predominantly to other children. M 54 addressed only 47 per cent of his language to children, as compared with the group average of 77 per cent. Thirteen per cent of his speech was addressed to teachers and 40 per cent was nonsocial. F 59 shows an even less social pattern, 34 per cent of her language being addressed to children, 16 per cent to the teachers and 50 per cent being nonsocial.

The children differed also in total amount of language, or volubility. Some were markedly non-expressive, as, for example, M 82, F 75, M 56, F 58 and F 39.[27] Others—M 54, M 47, M 80, M 84, F 83, F 77 and F 59—were extremely voluble. While M 54 and M 47 were both highly voluble and completely uninhibited in vocal expressiveness, the latter was a highly social child, the former, only moderately social according to our measures. F 59, similarly, stands out in contrast with F 77 as being a voluble nonsocial child. Singing to herself represented a considerable proportion of her nonsocial language. These differences suggest that total talkativeness may be a useful index in differentiating degrees of extroversion and introversion, especially when considered in conjunction with measures of frequency of social contact.

[26] Table XI (Appendix B).
[27] Table XI (Appendix B).

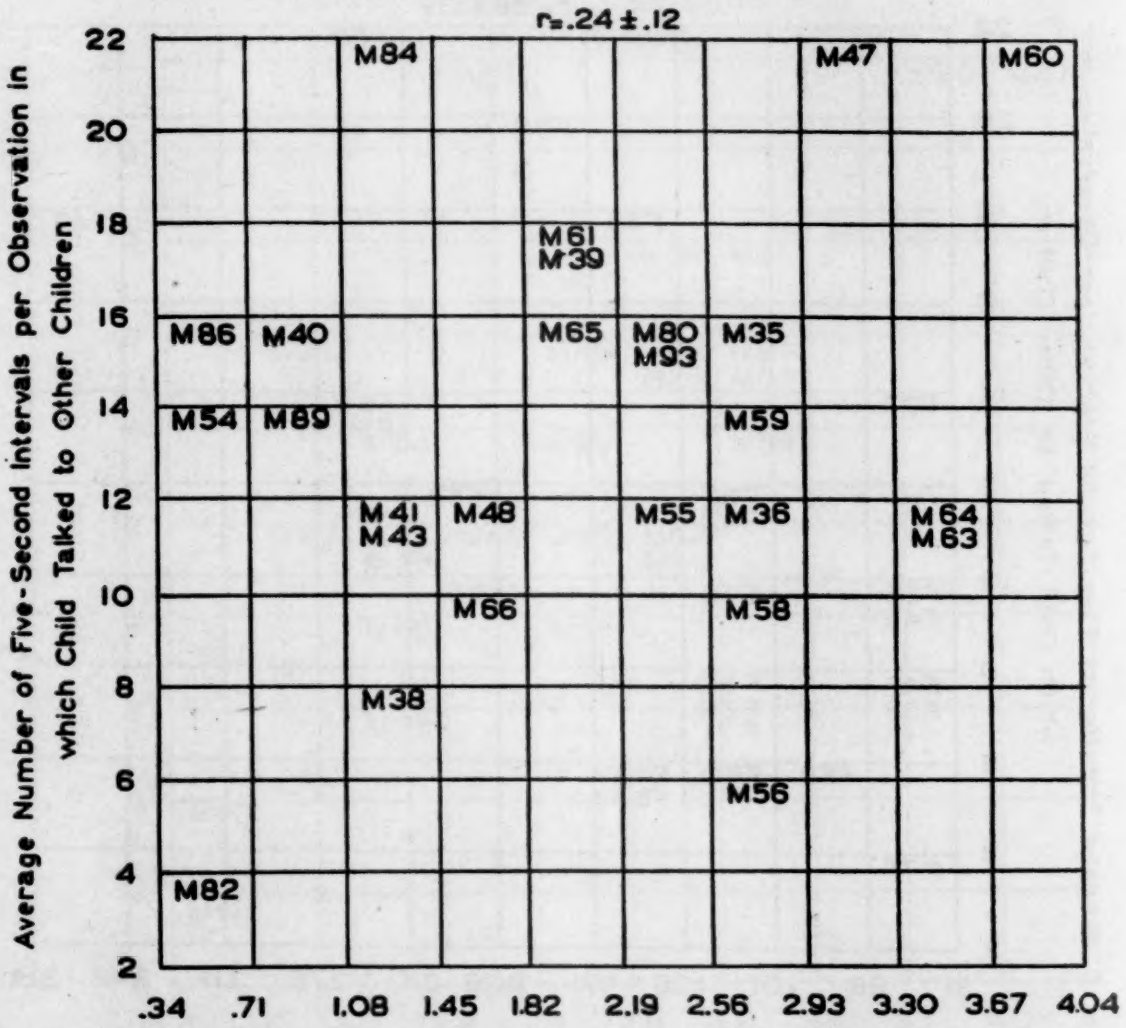
Of the three pairs of siblings included in the kindergarten group, F 57 and her younger brother M 86—observed, respectively, in 1932–33 and in 1933–34—showed the greatest similarity in social patterns. Both were involved in social contact, on the average, in about 14 intervals out of 60. Both were selective in their conversation with other children, M 86 addressing 79 per cent of his " speech to children ". to one boy and F 57, 69 per cent of hers to one girl. They had about the same proportion of nonsocial language but F 57 talked to the teacher more and had more physical contacts than her brother. Of the twins, M 82 and F 71, observed in 1933–34, the girl was more social than the boy but her average frequency of speech to other children was considerably lower than that for all girls. Neither twin talked very much to adults, the girl having a slightly higher average. She also initiated more physical contacts with other children than her brother, had more nonsocial language and distributed her contacts among more children. The social patterns of M 63 and his younger sister, F 47—observed in 1932–33 and 1933–34, respectively—show no particular similarity. The boy had no special friends in his group and worked more intensively than the girl whose activities were largely determined by those of her chum, F 83.

RELATIONSHIP BETWEEN VERBAL AND PHYSICAL CONTACTS

To discover whether there was any significant relationship between the frequency of verbal and of physical contacts in the social patterns of these children, the average frequency of speech to children was correlated with the average frequency of physical contact (material or non-material), separately for boys and girls, and the measures were plotted in the form of scatter diagrams, as shown in Figs. 9 and 10. While the two indices are positively correlated for many of the boys, some individuals deviate so markedly from the trend toward association of the two types of contact as to reduce the correlation coefficient to $.24 \pm .12$. M 84, for example, is a highly talkative child, conversing with other children more often than any other child in the group, but has a low frequency of physical contact. Similarly, M 86, M 40, M 54

and M 89 talk as much or more than the average to other children but have extremely low averages for physical contact. M 64, M 63, M 58, M 56 and M 36 show the reverse tendency, communicating through physical contact more than the average, and

FIG. 9. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE FREQUENCY OF PHYSICAL CONTACT WITH OTHER CHILDREN PER FIVE-MINUTE OBSERVATION FOR 26 KINDERGARTEN BOYS

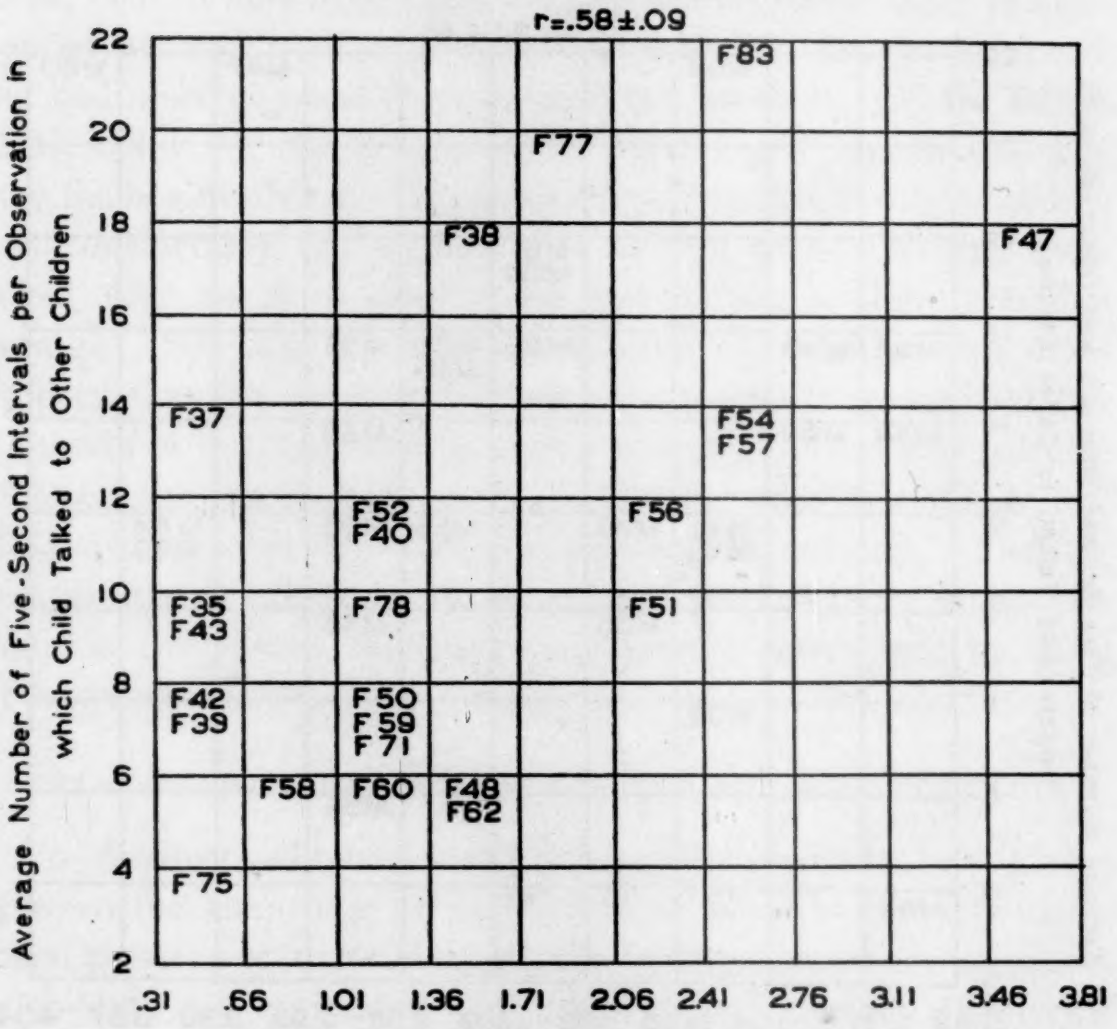


* Exclusive of "object" contacts.

through speech less than the average, for all boys combined. The two indices are more highly correlated for the girls (r=.58±.09) but here, too, we find individuals who are moderately talkative but have extremely few physical contacts, as, for example, F 37, F 35, F 43, F 42 and F 39. Others, notably F 62, F 48 and F 51,

show the reverse pattern. This contrast of positive and negative trends in the relationship between speech and physical contact for individual children is in conformity with the findings of Loomis (32). In a study of the physical contacts of nursery-

FIG. 10. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE FREQUENCY OF PHYSICAL CONTACT WITH OTHER CHILDREN PER FIVE-MINUTE OBSERVATION FOR 24 KINDERGARTEN GIRLS



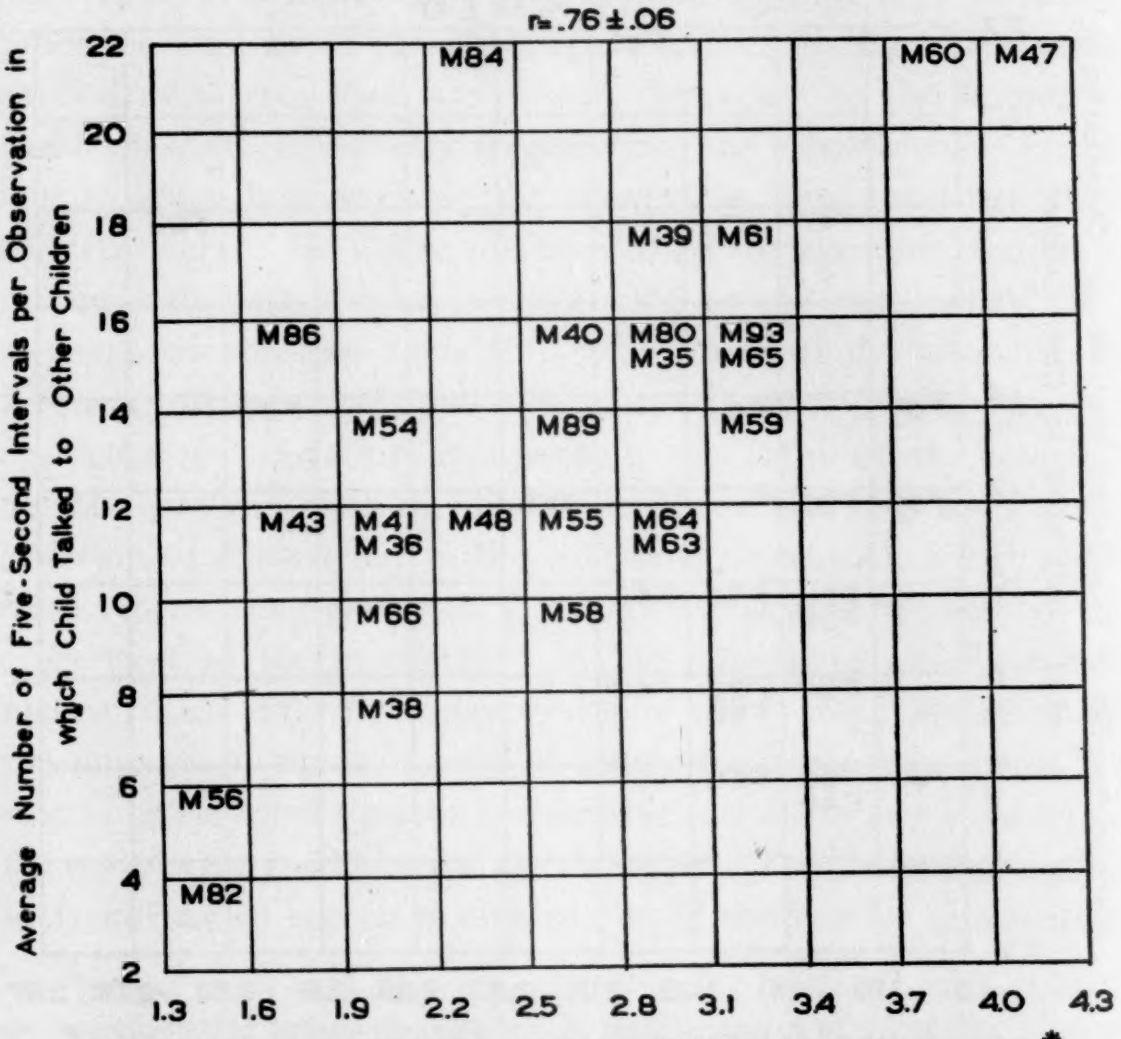
* Exclusive of "object" contacts.

school children, she compared the rank order of 13 children in number of words spoken and number of physical contacts. Ten of the children ranked in the same quartile, that is, they had either a low, high or average frequency in both aspects of behavior. The other three had a high frequency in one aspect and a low frequency in the other.

RELATIONSHIP BETWEEN FREQUENCY AND RANGE OF VERBAL CONTACT

To discover the relationship between the measures of frequency and range of verbal contact, the average frequency of speech to children was plotted against the average number of different chil-

FIG. 11. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE NUMBER OF DIFFERENT CHILDREN ADDRESSED FOR 26 KINDERGARTEN BOYS

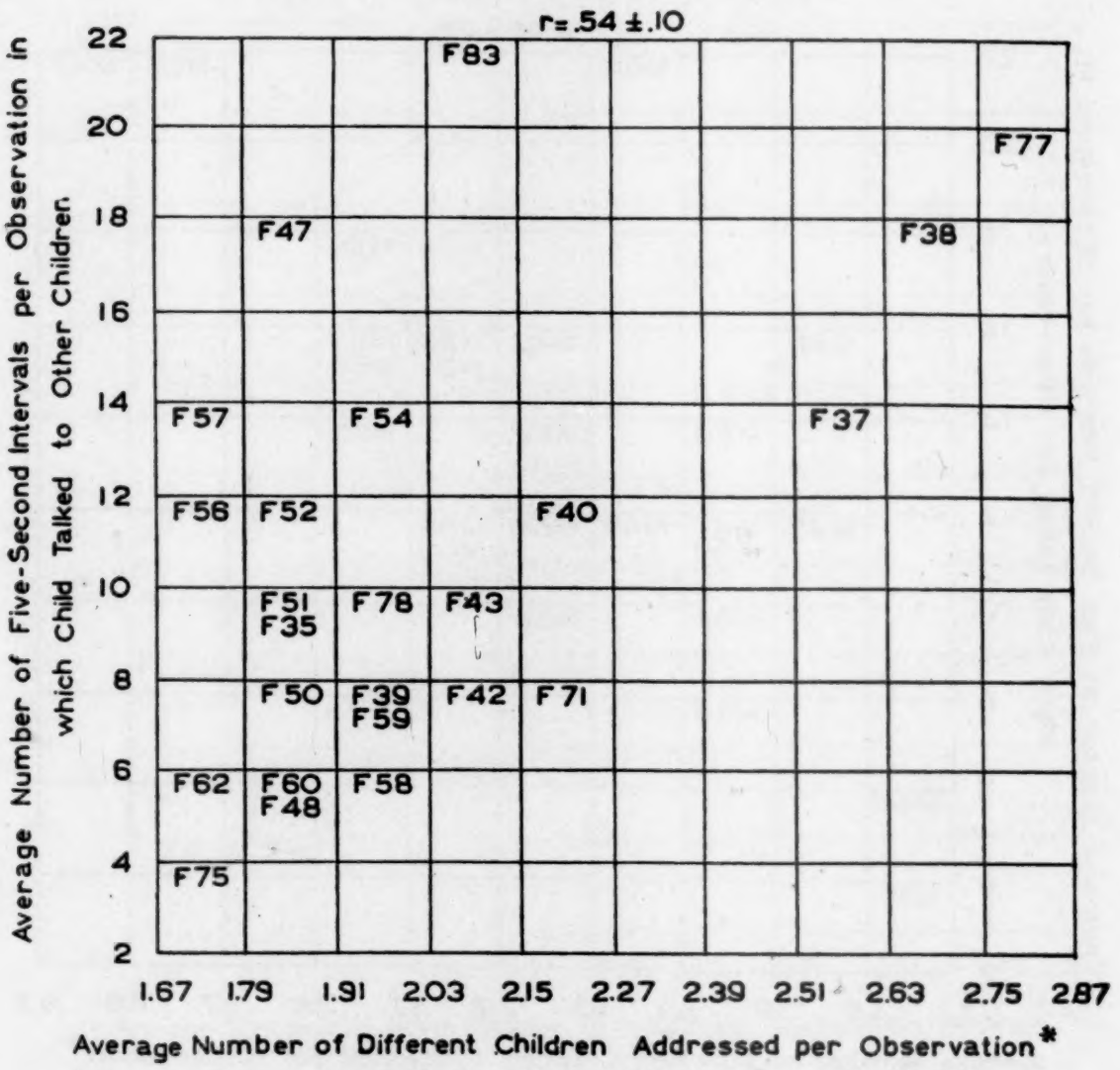


* Exclusive of observations in which no speech to children occurred.

dren addressed per child for each of the kindergarten boys (Fig. 11) and for each of the kindergarten girls (Fig. 12). We would expect to find a positive correlation between the two indices since the more a person talks, the more people he is likely to engage in conversation and this is the relationship which obtained for the majority of the children. The Pearson r coefficient of corre-

lation was .76±.06 for the boys and .54±.10 for the girls. But here again we find conspicuous deviates from the general trend. M 84, M 86, M 54 and M 43, among the boys, and F 83, F 47, F 57 and F 56 among the girls, have a narrower range of contact

FIG. 12. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE NUMBER OF DIFFERENT CHILDREN ADDRESSED FOR 24 KINDERGARTEN GIRLS



* Exclusive of observations in which no speech to children occurred.

than would be expected from the frequency with which they talked to other children. M 82, M 56, M 38 and M 66 talked very little to other children and when they did, talked to few children. M 60 and M 47, at the opposite extreme, have both a high frequency of speech to children and a wide range of verbal

contact. Of the girls, F 75, F 62, F 60, F 48 and F 58 talked little and to few children while F 77 and F 38 talked often and to a large number of different children.

VARIABILITY AND CONSISTENCY

Individual patterns have been defined primarily in terms of the average frequency with which specific forms of behavior were manifested over a period of several months in the same situation. Since the stability of these averages and the validity of the inferences drawn from them are directly dependent on the amount of variation in the day-to-day frequency of the behavior, it is important to know how variable, or, conversely, how consistent these children were. By virtue of the method of recording frequency in these studies, it was possible to compute for each child a measure of absolute variability (the standard deviation of the frequency distribution) and a measure of relative variability (the coefficient of variation representing the ratio of the standard deviation to the mean). The latter index has been used as the criterion of consistency in the following discussion, a low coefficient representing consistency, a high coefficient, variability.

In view of the inconstancy of the immediate social environment of each child from day to day in this " free " situation and the fineness of the unit used in computing frequency scores,[28] it was to be expected that the consecutive scores for any child would fluctuate widely within the 0–60 range. The daily fluctuations in frequency of speech to children in 32 consecutive observations

[28] The use of a five-second interval rather than a quarter-minute, half-minute or larger interval necessarily resulted in high measures of variability since the range of possible variation in any sample was from 0 to 60. Means, standard deviations and coefficients of variation, computed for the talkative boy M 47 on the basis of a retabulation of the data in terms of fifteen-second, thirty-second and sixty-second intervals are compared below with the corresponding measures based on the five-second interval.

	Size of Interval			
	5″	15″	30″	60″
Mean	21.12	13.22	8.37	4.72
σ	8.48	4.19	1.79	.62
V	40	32	21	13

are shown, in Fig. 13, for the two most talkative kindergarten boys, M 47 and M 84.[29] Both boys had an average frequency score of 21 but M 47 was the most consistent talker in the group, M 84, a fairly inconsistent talker. The latter fluctuates more widely from day to day, having a score of 37 in one observation and a score of 0 in the next and a total range of 0–49. The widest variation between any two consecutive scores for M 47 is, on the other hand, only from 7 to 32. In no observation did his frequency score drop below 7 or go above 41. This comparison shows that two children may converse with other children with equal frequency, as measured by averages based on equal numbers of samples, but the pattern of social talkativeness may be much more stable in one child than in the other. One may have a consistent pattern of much talking day after day, the amount of speech per sample fluctuating quite regularly within a given range and never falling below a given point. The other may talk almost continuously on some days, not at all on others. The explanation of these differences seems to lie in the intensiveness or extensiveness of the child's range of social contact. The child who talks to anyone who happens to be near him will have a consistent pattern of frequency while the one who talks only to certain people is likely to fluctuate widely from day to day and have high measures of variability. We have already noted that M 47 was a promiscuously social child who tended to talk to any one in his vicinity and that M 84 was selective in his social contacts.

Other children whose high variability in speech to other chil-

[29] Since there appeared to be a definite increase in the social talkativeness of M 47 from first to last observation, trends were computed for both children and the standard deviation of the obtained frequency scores from the trend points was calculated. With the origin at 16.5, the equations for the trends in the distributions for M 47 and for M 84, respectively, were

$$y = 21.12 + (.40)x$$

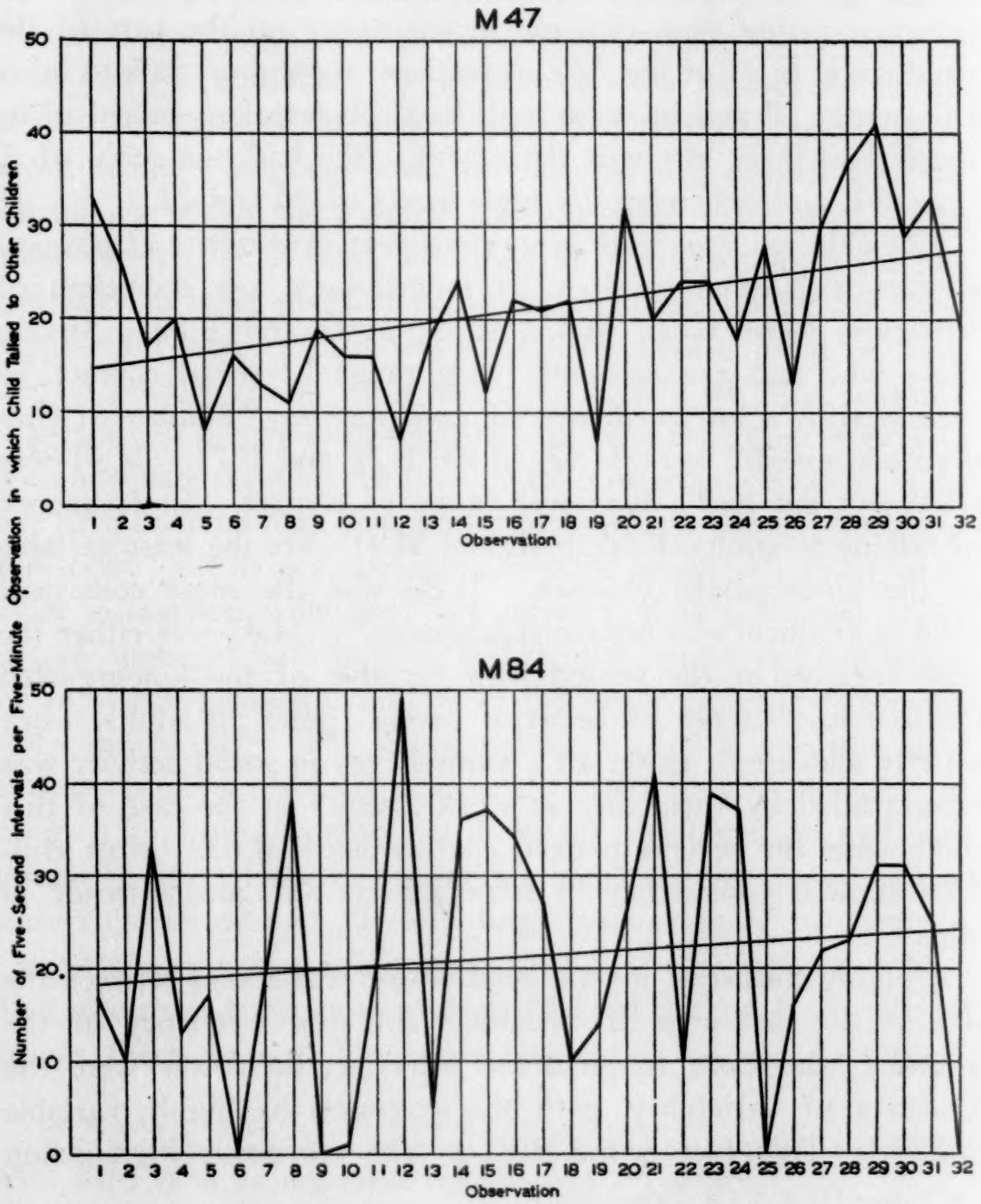
and

$$y = 21.22 + (.19)x$$

The standard deviation for M 47 drops from 8.5 to 7.6; that for M 84 only from 13.8 to 13.7. In other words, M 47 was actually even less variable than the original standard deviation indicated. The standard deviation would probably have been lower still if there had not been two high scores in the first and second observations of the series. These two high frequencies are presumably chance fluctuations since no explanation can be found for them in the records.

dren is probably attributable to the fact that they were selective in their social contacts were M 86, F 83, F 57, F 56 and F 59.[30] The extremely high measures of variability for the infrequent talkers give a false impression that these children were highly inconsistent when actually some of them were among the most consistent children. In the case of M 82, for example, the high

FIG. 13. SPEECH TO CHILDREN: FREQUENCY PER OBSERVATION IN 32 FIVE-MINUTE OBSERVATIONS OF TWO TALKATIVE BOYS, M 47 AND M 84


M47
M84
Number of Five-Second Intervals per Five-Minute Observation in which Child Talked to Other Children
0
10
20
30
40
50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Observation

[30] Table II A (Appendix C).

variability is largely due to the fact that, in one of his 32 observations, this boy talked to his twin sister for a much longer time than he was in the habit of talking to any one. The inclusion in the sample of the record involving the conversation with the twin, which was unrepresentative from the standpoint of the child's normal social tendency outside of his family group, gave this child a spuriously high index of variability which he does not deserve. Similarly, in the case of F 75, the extremely high coefficient of variation may represent poor sampling of the behavior rather than extreme inconsistency on the part of the child since, in 21 of her 32 observations, she did not talk to other children at all and in seven additional observations talked in no more than three intervals out of 60. She had one score of 5, one of 7, and two relatively high scores of 20 and 24.

The children who were most consistent in patterns of physical contact with other children, as judged by a low coefficient of variation, were M 60, M 47, M 59, M 93 and F 83. Among those who had a consistently wide range of social contact, as measured by a low coefficient of variation for "number of children addressed" were M 47, M 93, F 77 and F 71. M 41 was consistent but had a narrower range of contact. In frequency of talking to adults, F 60, F 48 and M 41 were the least variable of the kindergarten children. M 80 was the most consistent child in frequency of nonsocial language.[31] M 47 was either the least variable or the second least variable of the kindergarten children in all types of behavior except speech to adults, work activity and use of materials. Consistency in social activity was accompanied by variability in work activity in the case of this child while the reverse pattern characterized M 63. Most children showed consistency in some aspects and inconsistency in others.

A highly consistent inverse relationship was found between the size of the measures of variability and the frequency of the behavior; the more frequent the behavior, the lower were the measures of variability, with the exception of highly variable children. This fact is indicated by the uniformly high group

[31] Tables III A–VI A (Appendix C).

and individual measures for the kinds of behavior which occurred least frequently: physical contact and speech to adults.[32] Almost all of the coefficients of variation for these categories are over 100, which means that the standard deviations were larger than the corresponding means. The same relationship holds for most children who had low averages for any of the types of behavior studied.

From this analysis of the individual measures of frequency and variability, three distinct patterns of reaction to the social environment emerge: *the promiscuously social, the selectively social* and *the nonsocial.* The children were further differentiated on the basis of the degree to which they expressed themselves through language and through physical contact and the manner in which their social contacts were distributed. The promiscuously social child, according to our definition, is the one who talks to other people much more frequently and is involved in physical contact with others more often than is usual for children of his age group. For this type of child the mere presence of persons in his vicinity, regardless of who they are, appears to be an adequate stimulus for the initiation of social contacts. This sort of individual may be a leader or a bully or merely an attention-seeker, but in any case he is likely to be actively involved in social interaction whenever free interaction is permitted. The pattern appeared both in boys and in girls and at all age levels, the most conspicuous examples in the kindergarten group being M 47 and M 60.[33] The selectively social child is one who talks to other persons often or moderately often, may or may not be involved in physical contact but limits his social contacts to a very narrow group. He may confine his social activity to one or two other children or may direct a large proportion of his contacts toward adults. A number of examples of this type have been cited, the most conspicuous being F 83, M 86 and F 57. In all groups there were children who, according to our definitions,

[32] Tables III A and V A (Appendix C).

[33] F 3 in the younger nursery group, M 18 in the older group, and M 101, M 105 and F 98 in the first-grade group showed this pattern.

belong in the third group as being definitely asocial.[34] An almost complete absence of physical contacts characterized some of the promiscuously social and some of the selectively social children, notably, M 40, M 54, M 86, M 84 and F 37. M 54 was a peculiarly interesting child whose social pattern differed from that of any other child in the observed group. Apparently a completely uninhibited and happy-go-lucky child, he sang, hummed, whistled or talked to himself as he worked, but always, it seemed to the observers, with a weather eye cocked to observe the effect of his vocalization upon the people about him. While not belonging to any clique within the main group, he showed no evidence of wanting to be assimilated by the groups about him. His clothes were ragged and ill-fitting but he gave no sign of any feeling of inferiority or insecurity on this score.

Bühler (15), on the basis of experiments in which pairs of very young children were placed together in a play situation, distinguished three attitudes toward the situation and toward the other child which she calls the "socially blind," the "socially dependent" and the "socially independent." Whether or not one accepts Bühler's assumption that these attitudes toward a situation involving both material and social elements represent permanent inborn dispositions, the distinctions are fairly clear-cut and the descriptive labels seem aptly chosen. The "socially blind" attitude of the child who "seems to be only in contact with objects, not with other people" is exemplified by such children as M 56 in the kindergarten group and F 18 in the nursery school. M 6 and M 18 in the nursery school and M 101 in the first grade exemplify the "socially dependent" individual who "is always and with obvious effort in contact with other people"; M 47 in the kindergarten and M 105 in the first grade, the "socially independent" individual, who, though in contact with others, "never loses his own initiative or balance."

The present investigation was concerned only with the preliminary stage in a comprehensive study of social patterns, that

[34] M 15, M 16, F 18 and F 13 in the nursery groups and M 121 and F 97 in the first grade stand out as being less social than the majority of the children in their respective groups.

is, with certain basic problems involved in the measurement and description of characteristic patterns in individuals and in groups. A logical next step beyond the accurate description of social behavior patterns would be an evaluation of the observed patterns as desirable or undesirable and a modification of the undesirable pattern. In fact, one major purpose of the early studies of social behavior in young children was the detection of undesirable deviation at an early stage with a view to directing the course of development into more desirable channels. Recent experiments by Jack (**28**) and Page (**45**) at the Iowa Child Welfare Research Station represent a promising approach to the problem of modifying behavior by training. Jack measured what she calls ascendant behavior in 18 four-year-old children in terms of their reactions to an experimental situation. Ascendant behavior was defined to include "(1) the pursuit of one's own purposes against interference and (2) directing the behavior of others." Each child was observed in the same situation ten times, each time paired with a different companion. On the basis of these experiments, the children were grouped as ascendant, moderately ascendant and nonascendant. Special training in three situations, involving three different types of materials, was given to five children previously defined as nonascendant, with the purpose of increasing their self-confidence. These children were subsequently paired with untrained children in the same situations. Comparison of the initial ascendance scores with the training series scores revealed a definite increase in the degree of ascendance of the previously nonascendant children.

Page carried the research further, studying the effect of training on younger children—a group of seven three-year-olds—and on children previously defined as ascendant and moderately ascendant as well as on the nonascendant children. She also studied the effect on ascendance scores of attendance in a preschool group and the effect of training in experimental situations on behavior during free play. The changes resulting from training in self-confidence were found to be "larger than those attributable to preschool attendance" and the moderately ascendant as well as the nonascendant children showed an increase in the number of

manifestations of ascendant behavior after training. Some indication of the transfer of the effect of training to nonexperimental situations is afforded by her finding that four nonascendant children observed during free play for five five-minute periods each manifested ascendant behavior as often as four nontrained children observed for the same length of time in the same situation. Koch (30) reports a similar study dealing with the modification of unsocial behavior in children.

CHAPTER IV

WORK PATTERNS

The hypothesis which the nursery-school and kindergarten observations were designed to test predicated a differentiation of the children not only with respect to their social tendencies but also in terms of degrees of interest in materials. The criterion of interest, in the nursery-school study—the amount of time the child spent in active use of materials—did not adequately discriminate among the children because of a too comprehensive definition of what constituted "use of material."[1] In the kindergarten study, the definition was revised to include only purposive manipulation or transportation of work materials. Other potentially discriminative criteria of interest in materials which were considered for the kindergarten children were the child's choice of materials (the number and type of materials used during the entire observation period), the amount of time spent in working as compared with time spent in distraction from work and the frequency of distractions. Free choice of materials and a random effect of the kind of materials used upon the aggregate of short samples were assumed. The only control of the sampling of work behavior consisted in the rule to begin observation of a child only when he had an uncompleted task before him. This rule was designed to exclude the transition period occurring when a child had completed one piece of work and had not yet undertaken another, thus equalizing the opportunity for work for all children.

All five-minute records were classified according to the type of work (the job) indicated at the beginning of the observation.

[1] Slight manipulation of materials when the child showed no other evidence of interest in the material—a type of activity which was later excluded as non-functional use of material—was included in the nursery-school study for the reason that it was difficult to tell, in many instances, whether the activity was functional or non-functional, that is, whether the child was interested in the manipulation of the material or not.

If the child's activity changed during the five-minute period, the record was classified according to the type of work lasting the longer time. All jobs were then grouped into fourteen homogeneous categories and the distribution of each child's records among these categories was tabulated. Table 3 gives the individual distributions for the 50 kindergarten children, with totals for all boys and all girls and for the three situational groups. Group I includes the children observed in 1931–32; Group II, those observed in 1932–33; and Group III, those observed in 1933–34.[2]

The following indices were derived for each child: (1) the number of different materials used in the 32 observation periods, (2) the average time per observation—number of five-second intervals per 60—spent in working at the chosen job, (3) the average time per observation spent in functional use of work materials, and (4) the average number of periods of distraction from work per observation.[3] Index (2) included all behavior recorded under *Job Material, Job Self* or *Job Person;* index (3), only behavior recorded in the *Job Material* category.[4] These two indices were computed in the same manner as the measures

[2] It will be noted that the last three categories are not represented in the distributions for Group I. Putting pegs in boards and stringing beads were such rare occupations for this group that they were not included in the samples of work activity obtained for the observed group. Blowing soap bubbles did not occur at all in this kindergarten during the observation period. Playing house with dolls, and miniature house equipment (dishes, telephones, flatirons, etc.) was arbitrarily excluded in the observations of Group I because it was not an approved work activity. Children were permitted to use the dolls and doll house as a reward for having satisfactorily completed a work project. In School B, where use of dolls and related materials was less rigidly restricted, "playing house" was such a frequent occupation for certain children in the observed group that it became necessary to include it in the sample.

[3] A fifth index, based on the instantaneous classification of language content at the time of observation as relevant or irrelevant to the work in hand—the proportion of the child's total language in which he talked about his work—has not been developed because of the dubious reliability of this sub-classification of language.

[4] The *Job Material* category alone was used rather than a combination of the *Job Material* and *Non-Job Material* categories, since the latter included types of behavior which, in many instances, represented routine activities required by the situation which were not significant from the standpoint of the child's interest in materials as such. The amount of behavior recorded under *Non-Job Material*, furthermore, was so small that no appreciable change in the indices would have resulted from its inclusion.

of frequency of social contact.[5] Index (4) was obtained by counting the number of breaks—periods of distraction from work—in the continuity of the work activity in each of the 32 records for each child and computing the average number of distractions per observation. A distraction was defined as a shift from any *Job* column to a *Non-Job* column. The number of distractions per observation was, therefore, equivalent to the number of periods of continuous non-job activity.

Choice of Materials

An examination of Table 3 reveals marked differences in the frequency with which different materials were used by boys and girls and by the three situational groups. The sex differences are shown graphically in Fig. 14 in the form of percentage distributions of the 832 observations for all boys combined and the 768 observations for all girls combined, according to type of work activity. Blocks, picture puzzles and crayons were the materials most frequently chosen by the boys. These materials were used, in the order mentioned, in 35 per cent, 15½ per cent, and 10 per cent of the total number of observations. Crayons, picture puzzles and paints were the materials most often used by the girls, representing, respectively, 25 per cent, 19 per cent and 12½ per cent of the total observations. Moulding objects with clay, looking at picture books and blowing soap bubbles were activities in which boys and girls engaged with about equal frequency. The greater frequency of block building and of sawing and hammering (involving use of wood and cardboard) for the boys and of crayon-drawing, painting and sewing for the girls is in agreement with the results of Farwell's more rigidly controlled

[5] A frequency score was assigned to each of the 32 five-minute records for each child. The score might be 0, 1, 2, 3, etc., up to 60, according to the number of five-second intervals in which the child was working at the chosen job (index 2) or using materials functionally (index 3). If he did not work at all during a five-minute observation, the score was 0; if he worked continuously throughout the period, he received a score of 60. The total number of intervals in which the behavior occurred in all observations combined was divided by the total number of observations to obtain the indices of average tendency.

TABLE 3

DISTRIBUTION OF 32 FIVE-MINUTE OBSERVATIONS PER CHILD BY TYPE OF WORK ACTIVITY

Group	Child	Crayons	Blocks	Sewing	Cutting, Pasting	Sand	Painting	Clay	Blackboard	Sawing, Hammering	Books	Puzzles	Pegs, Beads	Soap Bubbles	Dolls, etc.	Total
	M 35	6	8	5	2	1	2		1	7						32
	M 36	5	11		2	5	3	2		1		3				32
	M 38	8	7	3	3	3	5		1	2						32
	M 39	11	7		1	2	1	2		1	4	3				32
	M 40	12	4		3	1		5	1	3	1	2				32
	M 41	9	5	4	2	5	4	1		1		1				32
	M 43	14	11		2	2			1		2					32
I	F 35	28			2		2									32
	F 37	9	1		1	6		4	10		1					32
	F 38	15	1	7	4	2	1	1	1							32
	F 40	17		9	1	1	2	1			1					32
	F 39	19		5	3		1	2	1		1					32
	F 42	22		4	3	1	1				1					32
	F 43	19			3		1		5		4					32
	Total	194	55	37	32	29	23	18	21	15	15	9				448
	M 55		15		3	4		1	3		3	1	2			32
	M 56	3	18			2	5	1				3				32
	M 58		11		2	3	1			1	1	13				32
	M 54	2	4		2	2	2	3		4	2	11				32
	M 59	2	9		1	3		1	2			13		1		32
	M 60	1	14			5	1	3	3	1		4				32
	M 61	2	10		2	1	2	3	1	3		8				32
	M 63	1	6		2	3		1		1	2	12		4		32
	M 64		13		1	3	1	1	1	2		8	1	1		32
	M 65	1	9		2	2	1	3	2	1	1	8	1	1		32
	M 66	4	5		3	1	6				2	11				32
II	F 51	3	3		3	1	9	2			2	4	2	2	1	32
	F 50	2	2		4		9	1	2			8	2	2		32

TABLE 3—*Continued*

Group	Child	Crayons	Blocks	Sewing	Cutting, Pasting	Sand	Painting	Clay	Blackboard	Sawing, Hammering	Books	Puzzles	Pegs, Beads	Soap Bubbles	Dolls, etc.	Total
	F 52	2	2		1		4	1	2			16	3	1		32
	F 54	2	4		1	1	2	1	1			14	2		4	32
	F 56	2	3		4			1	1		1	5	9		6	32
	F 57	1		1			2	1	1		3	16	1		6	32
	F 58	8	1		5		2	1	2			13				32
	F 59	1		2	4		3	1	2	1	1	13	1	1	2	32
	F 60	13	3		3		3	1	2		1	3	3			32
	F 62	9	1		5		7		4			5		1		32
	Total	59	133	3	48	31	60	27	29	14	19	189	27	14	19	672
	M 80		18			4	2		1			5	1		1	32
	M 82		5		3	1	2	2	2		2	12	1	1	1	32
	M 84		19			2	4	2				2	2		1	32
	M 86		25		1		2					4				32
	M 47		20			2	5	3	1				1			32
	M 48		11		6	3	4	2	2	1		3				32
	M 89		7		4	2	9	3	1	4	1		1			32
	M 93	1	21		2	2	2		1			2	1			32
III	F 71	1	2		4	1	9	1		1	2	7		1	3	32
	F 47	1			8		1	2	6			14				32
	F 48	7	4		3		9	3	2	3		1				32
	F 75	5	1		2		12		1	2		8	1			32
	F 77		5		2	1	6		2			12		1	3	32
	F 78	3	10		3		8	4	1	1	1	1				32
	F 83	6	2		7		2	1	4			9	1			32
	Total	24	150	0	45	18	77	23	24	12	6	80	9	3	9	480
	Grand Total	277	338	40	125	78	160	68	74	41	40	278	36	17	28	1600
	Boys	82	293	12	49	64	64	39	24	33	21	129	11	8	3	832
	Girls	195	45	28	76	14	96	29	50	8	19	149	25	9	25	768

study of spontaneous choice of materials by kindergarten, first- and second-grade children in two New Haven schools (18). The fact that boys choose blocks more often than girls and that block-

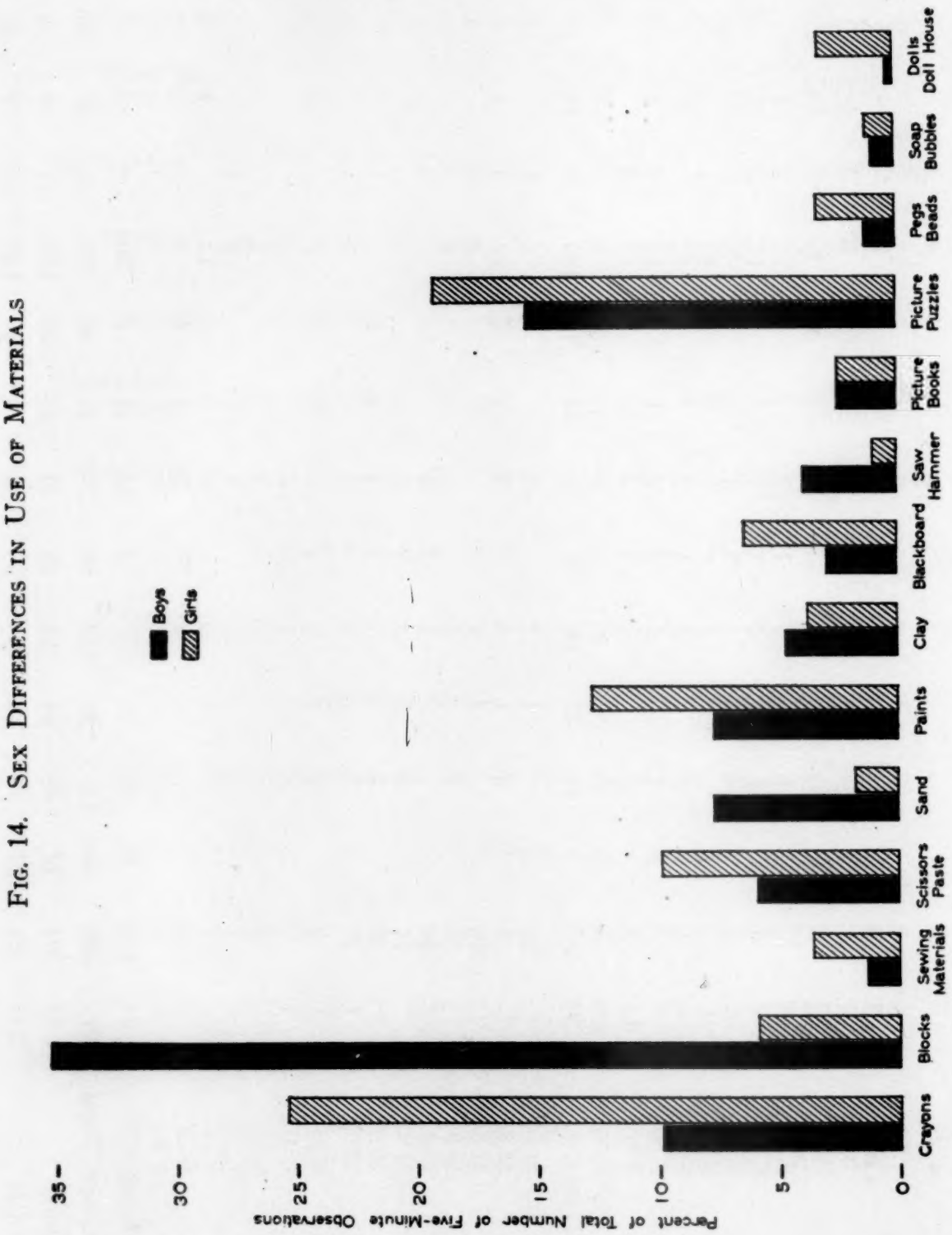


FIG. 14. SEX DIFFERENCES IN USE OF MATERIALS

building tends to be a group activity has been reported in most studies of sex preferences in choice of materials. The sex differences in choice of blocks, dolls, sewing materials and woodwork

presumably reflect culture-imposed patterns rather than genuine differences in interests. It is generally assumed that boys will work with the large blocks and with saw, hammer and nails at the work bench and that girls will choose the more ladylike occupations.

The group differences, as revealed by the percentage distributions of the 448 observations for Group I, the 672 observations for Group II and the 480 observations for Group III, among the fourteen types of work activity, are shown in Figure 15. Drawing or coloring with crayons was the predominant activity in Group I, 43 per cent of the total number of observations for this group falling within this category;[6] block-building, the second most frequent activity, representing 12 per cent of the total records. In Group II, 28 per cent of the total number of observations represent use of picture puzzles and 20 per cent, use of blocks. In Group III, blocks, picture puzzles and paints were the most frequently used materials, representing, respectively, 31 per cent, 17 per cent and 16 per cent of the total. The high frequency with which puzzles were used by the children in Group II is to be attributed to the fact that jig-saw puzzles were in vogue at the time observations were made of this group, the interest aroused outside of school creating an unusual demand for puzzles in school. Sewing was the third most frequent activity in Group I, representing 8 per cent of the total, but occurred in only three observations in Group II, and not at all in Group III. Moulding objects out of clay, drawing at the blackboard, sawing and hammering, and cutting and pasting occurred in about the same proportion in the three sets of observations.

When we examine the distribution of the records for individual children among the different types of work activity, we find that the general tendency was to use a variety of materials. Thirty-eight of the 50 children used one kind of material in 10 or more observations. Nine children in Group I and one in Group II (F 60) had 11 or more records of work with crayons; 15 children had at least 10 block records and 13 children had 11

[6] For discussion of the effect of this high proportion on intergroup comparisons, see pp. 174–175, *infra*.

or more picture puzzle records. F 75 was engaged in painting in 12 of her observations and F 37 had 10 records of drawing at the blackboard. The fact that some children in Groups II and III—F 51, F 59, F 71, M 65 and M 82, for example—have

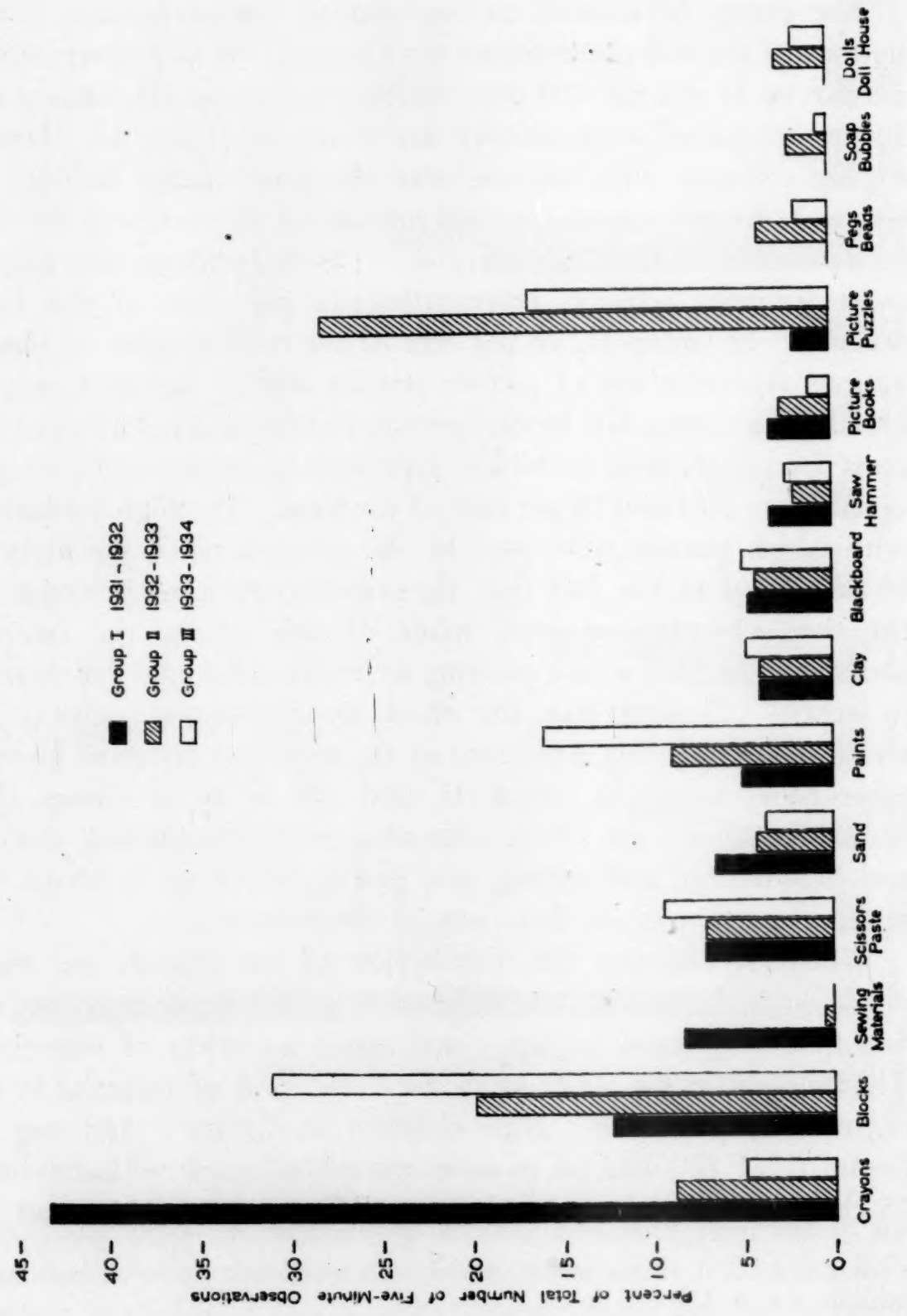


FIG. 15. GROUP DIFFERENCES IN USE OF MATERIALS

records in 11 or 12 of the 14 possible categories may be significant or may merely be the result of chance. It assumes significance only when the indices for frequency of work activity and for use of work materials were also high.

Two children deviate strikingly from the general pattern of using a variety of materials. F 35 used only three kinds of materials during the entire observation period. In 28 of her 32 observations, her work was drawing with crayons, in two observations she used paints and in the remaining two her activity was cutting and pasting. This fact, taken in conjunction with the low indices for frequency of work and frequency of functional use of materials obtained for this child, suggests a consistent pattern of indifference toward materials.

The other child who had an extremely narrow range of work activity is M 86 who worked with blocks in 25 out of his 32 observations. His other seven observations include four picture puzzle records, two painting records and one record of cutting and pasting. In the case of this child, too, the obtained range of contact with materials probably represents a pattern peculiar to the child rather than an unrepresentative sampling of the child's work behavior. We have already noted that this boy was selective in his social contacts, addressing 79 per cent of his *speech to individuals* to one child, M 84. His concentration upon block activity may have been due to the fact that M 84 was also using blocks or may have represented the line of least resistance for a child whose natural tendency was to keep aloof from the group as a whole. M 56, a distinctly nonsocial child, used blocks in 18 of his 32 records but used them for the most part in isolation from the main group working with blocks, being joined occasionally by one or another of three boys, all of whom were non-aggressive, unpopular children. Painting, a definitely nonsocial activity, was his choice of work in five other records. F 75, another extremely asocial child, chose individual rather than group projects, having a predominance of painting and picture puzzle records.

Frequency of Work Activity

How much time did these children actually spend in working at their chosen tasks during this work period? To what extent, in other words, did they conform to the requirements of the situation? The percentage distributions of all five-minute observations for boys and girls according to the frequency of work activity per observation—number of five-second intervals in which the child worked on his job—as shown in Fig. 16, reveal the characteristic pattern of conformist behavior which we would expect to find in this situation.[7] In 79 per cent of the total number of observations for boys and 75 per cent for girls, the frequency score was 40 or more, that is, the children spent at least two thirds of the five-minute period at work. In 18 of the boys' records and in 12 of the girls' (2 per cent of the total number of observations for both groups) the frequency score was 60, which means that work was continuous throughout the five-minute observation period. At the opposite extreme we find only one observation each for boys and girls in which the child did not work at all.[8]

The average amount of time spent in work[9] by the group as a

[7] Allport (1) has developed an interesting "J-curve hypothesis of conforming behavior" which is directly pertinent to the point under discussion and which he states as follows: "In a field of conforming behavior degrees of conformity are distributed upon their appropriate telic continuum in decreasingly diminishing proportions as one proceeds from the most widely practiced form of the act toward the greatest recognizable deviation from that form. Or, more simply: In a field of conforming behavior, the distribution of degrees of conformity upon their appropriate telic continuum is in the form of a curve of positive acceleration." The hypothesis is illustrated from a variety of fields in which conformity to a particular pattern is expected—such patterns, for example, as obeying traffic signals, conforming to parking regulations, punctuality of factory workers as indicated by time clock records, time of arrival at church, participation in group singing in church and genuflection in the Catholic Church.

[8] The decrease in the frequencies at the extreme high end of the scale may be due partly to the effect of the artificial break in the continuity of behavior at the beginning and end of the five-minute observation. There would perhaps have been more scores of 58, 59 and 60 if the time span covered by the five-minute observation had begun a few intervals earlier or continued a few intervals later. But the downward trend at the high end of the distribution more probably reflects the fact that a considerable amount of freedom was permitted in this situation and that the children were not expected to work all the time.

[9] Table VII A (Appendix C).

FIG. 16. WORK ACTIVITY: PERCENTAGE DISTRIBUTION OF ALL FIVE-MINUTE OBSERVATIONS BY FREQUENCY SCORE PER OBSERVATION

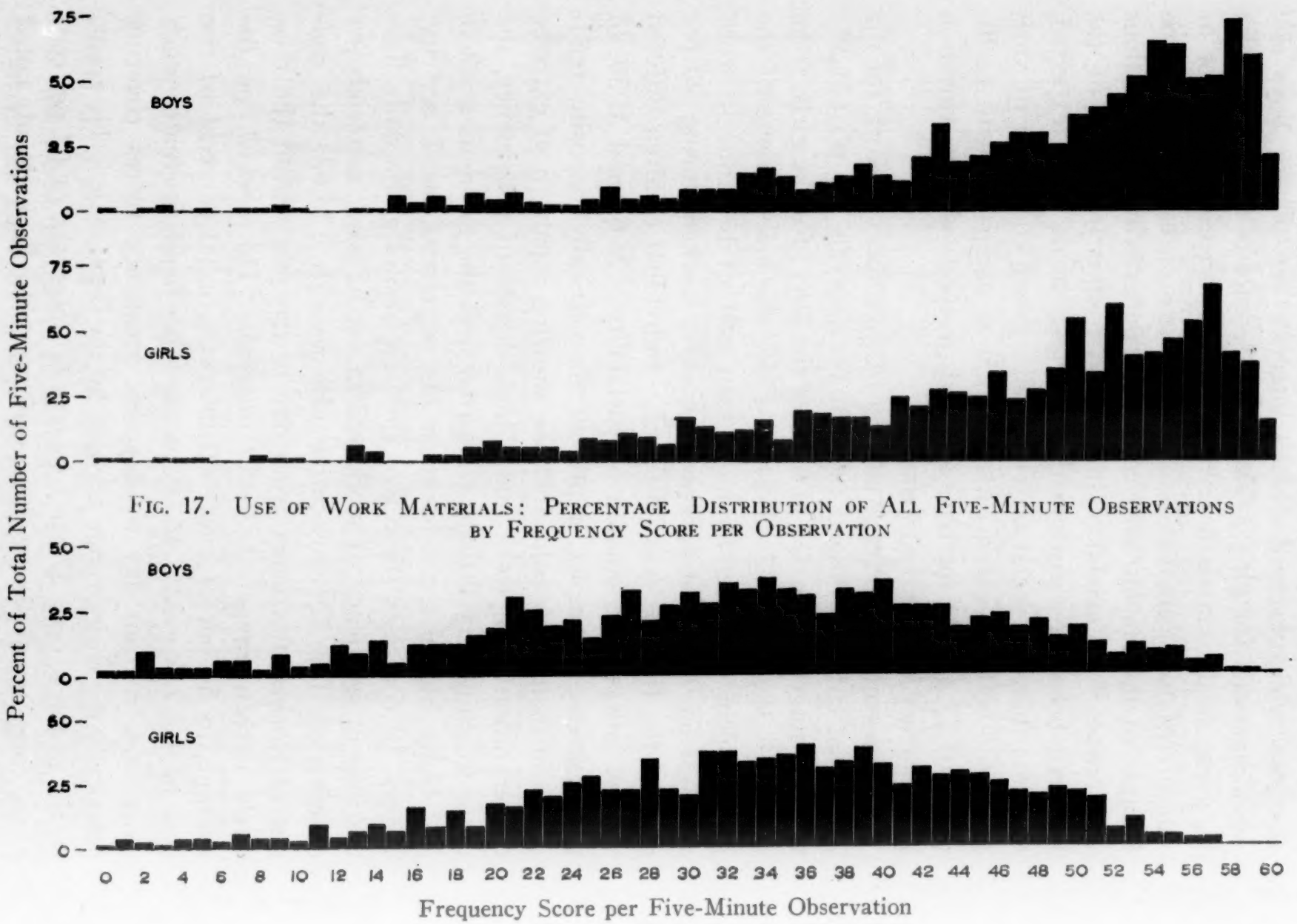


FIG. 17. USE OF WORK MATERIALS: PERCENTAGE DISTRIBUTION OF ALL FIVE-MINUTE OBSERVATIONS BY FREQUENCY SCORE PER OBSERVATION

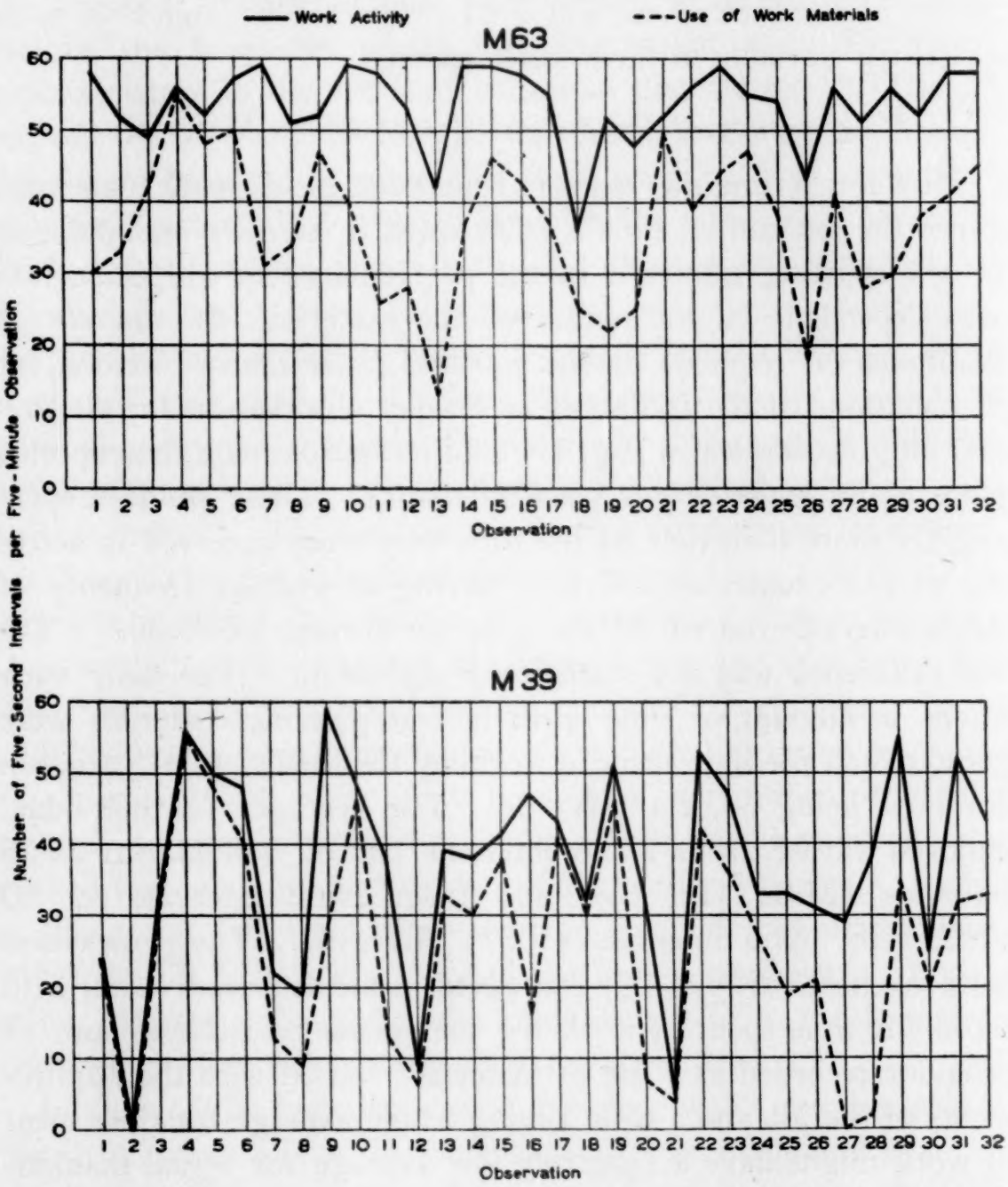
whole was equivalent to somewhat more than three fourths of the total time observed—47.19 intervals per 60 for boys and 45.77 intervals for girls. The sex difference is more than twice as great as the standard error of the difference but cannot be interpreted to mean that boys work more or harder than girls because of the uncontrolled conditions under which observations were made.[10] Variability in the day-to-day frequency of the required behavior—work with materials—as is to be expected, was less than for social activity. The group coefficient of variation for both boys and girls was 25, as compared with coefficients of 77 and 94 for boys and girls, respectively, for variation in frequency of social contacts.

The measures of average amount of time spent in work for the individual children ranged from 36.66 intervals per 60 (M 39) to 53.59 intervals per 60 (M 63) for the boys; for the girls, from 30.50 (F 35) to 51.37 (F 51). F 35, the low extreme of the group, spent only slightly more than half of her time in work while M 63, the most persistent worker, worked during 90 per cent of the time he was observed. Individual children differed widely, however, in amount of variability. M 63 and M 39, to take extreme examples, represent diametrically opposite tendencies in their work behavior, one showing a pattern of extreme concentration upon work and a high degree of consistency, the other working very little as compared with the group as a whole and being highly inconsistent in his pattern of work activity. Figure 18 contrasts these two children, showing the daily fluctuations in frequency of work and in use of work materials per observation for 32 consecutive observations. M 63, the consistent worker, fluctuates from day to day but within the relatively narrow range of 36–59 intervals. He worked, on the average, in 54 out of every 60 intervals or 90 per cent of the time he was observed. M 39, on the other hand, fluctuates much more widely from day to day, his frequency scores covering practically the entire range allowed by the 0–60 scale. He spent, on the average, only 37 out of every 60 intervals, or 62 per cent of the time he was observed, in working. We have already noted

[10] See pp. 171–172, 174, *infra*.

the fact that he was one of the promiscuously social children who talked to other children often and had an extensive range of verbal contact. M 63, on the contrary, was only a moderately

FIG. 18. WORK ACTIVITY: FREQUENCY PER OBSERVATION IN 32 FIVE-MINUTE OBSERVATIONS OF A CONSISTENT WORKER (M 63) AND AN INCONSISTENT WORKER (M 39)



social child and was as inconsistent in his social contacts as he was consistent in his work activity. In the case of both these children, the patterns appear to represent the genuine trend of the child apart from the influence of the situation, since the obser-

vations covered a variety of different kinds of work and the fluctuations seem to be unrelated to the type of materials used. The lack of consistent relationship between the frequency of work and the frequency with which work materials were functionally used on a given day is particularly clear in the diagram for M 63. Other children who were highly consistent workers were M 66, M 56, M 82, F 58, F 60 and F 51. M 40, F 35 and F 40 were extremely variable in their work activity.

Frequency of Functional Use of Work Materials

How much time was spent in functional use of work materials? Since the amount of time a child spent in actually manipulating or transporting materials in the performance of a specific task was dependent on the nature of the materials, the amount of manipulation required by the job and other chance factors, the distributions of the frequency scores per observation for all boys and all girls, shown in Fig. 17, tend to approximate the expected pattern for behavior governed by chance. These children spent slightly more than half of the time they were observed in active use of work materials, the boys having an average frequency of 32.52 intervals out of 60, the girls, an average of 33.50.[11] The sex difference was not statistically significant. The daily variations in amount of time spent in manipulating materials were greater than for time spent in working, the coefficient of variation for boys being 38, for girls, 34. The averages for individual children varied from 25.28 intervals per 60 (M 43) to 39.75 intervals (M 82) for boys and from 24.62 intervals per 60 (F 35) to 38.66 intervals (F 51) for girls. These measures were not necessarily closely correlated in the same individual with those for time spent in work for the reason that the amount of behavior recorded as "use of material" varied with the requirements of the job and a child having a high average for time spent in work might have a relatively low average for actual manipulation of work materials if the materials he selected happened to necessitate a small amount of manipulation. Some children, however, did have high indices for both types of behavior, as, for

[11] Table VIII A (Appendix C).

example, M 82 and M 56, while others had low indices in both, as in the case of M 47, M 39, M 80 and F 35.

Frequency of Distractions

How often were children distracted from their work? Since the number of distractions was largely governed by chance factors, the frequency scores per observation were distributed approximately in the form of a normal distribution.[12] The 18 records for boys and 12 for girls in which there were no distractions were balanced by about the same proportion of records of extreme distractibility, records in which the number of breaks in work activity ranged from 16 to 25. Distractions occurred, on the average, six or seven times during a five-minute observation, the girls having a slightly higher average than the boys—6.99 as compared with 6.47.[13] The sex difference, though more than twice as great as the standard error of the difference, is probably not significant because of the effect of the kind of materials used on this index.[14] The average number of distractions from work per observation for individual children ranges from 4.37 to 10.75. We would expect the children who spent most time in working to have the lowest measures of distractibility and *vice versa* and this relationship does hold true for many of the children. M 82 and M 66 who were consistent workers have the lowest averages for distractibility. The four boys who were most often distracted, as measured by this index, were social children who ranked low in amount of work. F 35, the least frequent worker in the group, has the highest average frequency of distractions. M 80, M 47, F 39 and F 56 had the lowest coefficients of variation, indicating that they were most consistent in the frequency with which they were distracted from their work.

In view of the fact that use of materials was a requirement of the situation in which our observations were made and that our routine sampling procedure did not adequately separate the individual pattern from that induced by the situation in many

[12] Table IX (Appendix B).
[13] Table IX A (Appendix C).
[14] See pp. 171–172, 174, *infra*.

instances, it is doubtful whether we can consider the indices described in this chapter as indicative of interest, or lack of interest, in materials *per se*. The index which we expected to be most discriminative—the frequency with which materials were used—was to some extent invalidated by the fact that different materials required different amounts of manipulation and that the various types of materials were disproportionately represented in the samples of behavior for the individual children. For these reasons, the average amount of time spent in working, whether manipulating materials or not, seems to be the most discriminative measure. We have measured the extent to which the children worked during this work period in which they were supposed to work most of the time. The extremely low indices for time spent in work and in use of work materials can probably be interpreted as representing either a dominance of social over material interests, or indifference toward materials or just plain laziness. The high indices, on the other hand, are less easy to interpret. They may represent genuine interest in materials as such or they may be indicative either of conformist or of asocial tendencies in the child. The child who worked most may be the goody-goody type of child who did what he was supposed to do or he may be a child who took refuge in work because he was afraid of getting involved in social contacts.

Although we cannot claim to have differentiated the children in terms of degrees of interest in materials, we have distinguished characteristic patterns of working or not working in a situation in which work was expected. The most conspicuous deviate is F 35, the girl whose narrow range of materials used has already been noted. This child spent less of her time in work than any other child in the group, working during only half of the time she was observed. The work she selected, with two exceptions, was crayon-drawing which was easiest to do and entailed a minimum of teacher supervision. She also spent least time in manipulation of materials and had the highest measure of distractibility. This pattern of lack of interest in materials, or at least of interest in acquiring skill in the use of materials, persisted in the third-grade work situation where she was observed three years later.

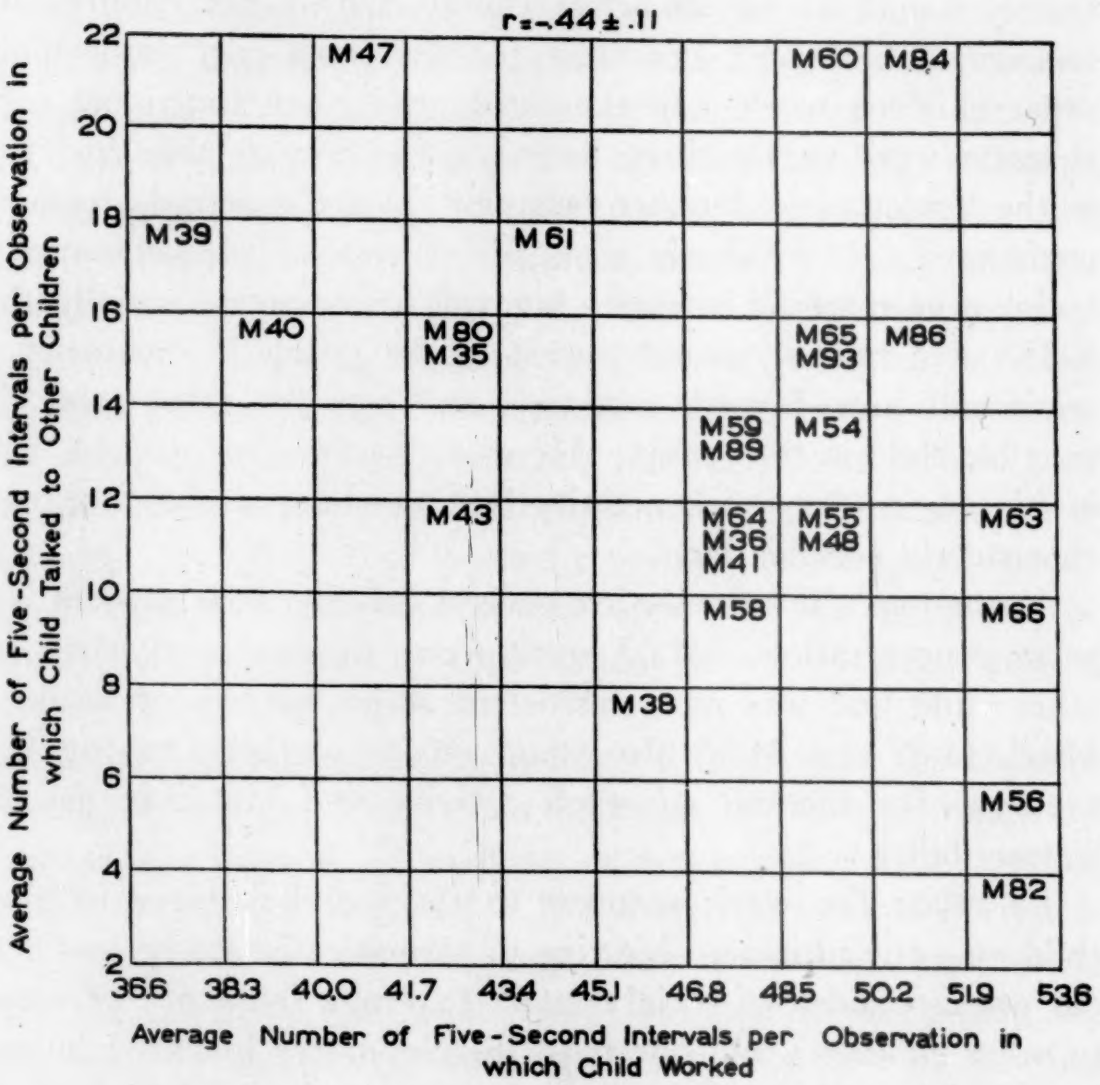
Although no record was kept of the amount of time spent in using materials in the third grade, the child's activity during each five-minute period was recorded. While other children completed a number of different pieces of work during the period covered by the third-grade observations, this child used only one type of materials, spending her time in showing other children how to do their work and never getting beyond the rudimentary stages in her own. In the kindergarten, F 35 was only moderately social, as far as active contact with other children was concerned, but spent her time for the most part in watching other children work. In the third grade, her functional social contacts were nearly three times as frequent as they had been in the kindergarten but her behavior toward materials remained unchanged. M 39 shows a similar pattern of predominance of social over material interests but was more active socially than F 35. He ranked second lowest in the group in frequency of work and use of work materials and was the third most distractible child in the group. He was also the most variable child in his day-to-day work activity but was one of the four most consistently sociable boys.

At the opposite extreme are several children who worked with great concentration. M 63 spent more time in work than any other child and was most consistent in his pattern of working. M 66, M 82 and M 56 also stand out as workers, having high averages for amount of work activity and low averages for distractibility.

To relate the work patterns to the social patterns of these children—our ultimate objective in planning the study—we took our primary index of social contact (average frequency of speech to other children) and our most discriminative index of interest in materials or in work (average frequency of work activity) and plotted the two indices for each child one against the other. Fig. 19 shows the relationship between the two measures for the kindergarten boys, Fig. 20, the corresponding relationship for the girls. We would expect to find either a positive or a negative correlation between the two measures or at least a tendency in one direction or the other. The social child would presumably work

little and the nonsocial child, a great deal, or a child might combine his social activity with his work. The predominant tendency for the boys was toward inverse correlation of work and social contact, the boys who worked most tending to converse least, and *vice versa*. The Pearson r coefficient of correlation between the

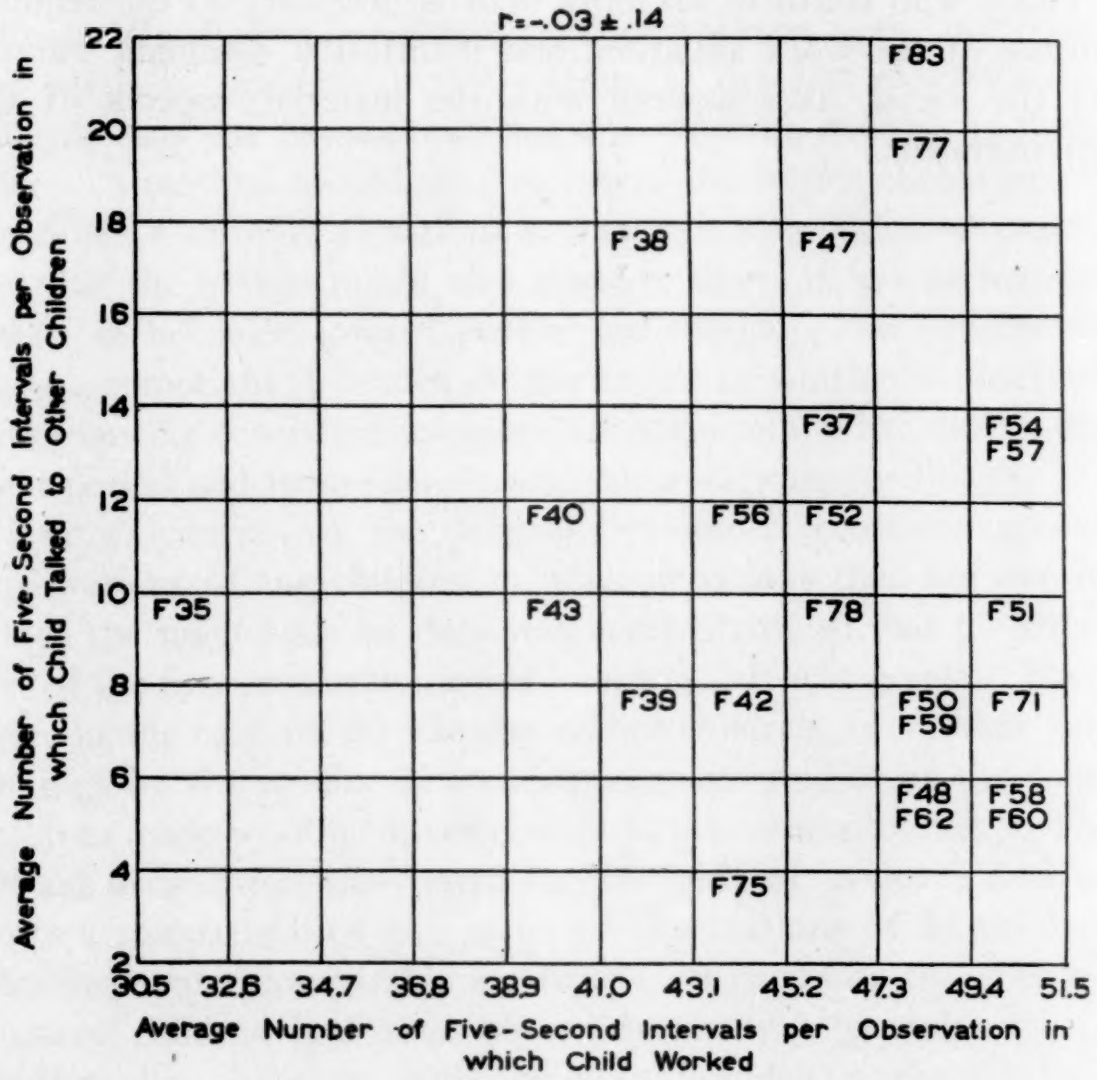
FIG. 19. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE FREQUENCY OF WORK ACTIVITY PER FIVE-MINUTE OBSERVATION FOR 26 KINDERGARTEN BOYS



two measures was $-.44\pm.11$. In the upper left section of the diagram are the socially-inclined children who spent relatively little time in working, M 39, M 40, M 47, M 80, M 35 and M 61. These six boys were more often involved in social contact and less often engaged in work than the average for the entire group of boys. In the upper right corner of the diagram we find two boys, M 60 and M 84, for whom the paired measures are posi-

tively correlated. These boys were highly social but were also among the more steady workers. In the lower right section are M 82, M 56, M 66 and M 63 who spent their time in working rather than in social activity. They talked to other children less than the average amount for their group and worked more con-

FIG 20. RELATIONSHIP BETWEEN AVERAGE FREQUENCY OF SPEECH TO OTHER CHILDREN AND AVERAGE FREQUENCY OF WORK ACTIVITY PER FIVE-MINUTE OBSERVATION FOR 24 KINDERGARTEN GIRLS



stantly than other members of the group. Fig. 20 shows no consistent relationship between work and conversation for the girls, the coefficient of correlation between the paired measures being $-.03 \pm .14$. As was the case with the boys, some children show an inverse relationship between frequency of work and frequency of conversation with other children, as, for example,

F 60, F 58, F 62, F 48, F 59 and F 50. Others, notably F 83, F 77, F 47, F 40 and F 43, show a positive correlation between the two measures. F 35 deviates from the rest of the group, working much less than any other child and being only moderately talkative. These results substantiate our initial assumption of individual differences in degree of interest in things as compared with interest in persons since even in a situation weighted in advance in favor of preoccupation with materials, we find individuals who conform no more than is necessary to the requirements of the work situation, and manifest a dominant interest in the social, as compared with the material, aspects of the environment.

CHAPTER V

CONSTANCY OF SOCIAL PATTERNS

In the two preceding chapters, individual differences in the frequency and patterning of specific aspects of behavior were discussed in terms of certain quantitative indices designed to differentiate degrees of interest in, or concern with, materials and persons. Implicit in this attempt to describe characteristic patterns was the assumption that the patterns defined in these "free" situations would also represent the normal behavior of the children in other situations at the same stage of development and that the indices might also measure more or less permanent trends in behavior toward people and things. The validity of these assumptions depended on the extent to which the observed patterns were consistent from one situation to another during the same period and from year to year under varying conditions.

The exigencies of the program precluded contemporaneous observations of the children in other situations than the one in which the main body of data was accumulated so that no direct test of the first assumption could be made. It was possible, however, in the case of the nursery-school children, to validate our findings by the results of contemporaneous studies of the same children made by other investigators in the same situation.[1] The second assumption was tested on the basis of evidence derived from a comparison of two series of observations of 24 children obtained under comparable conditions. Fifteen of the younger nursery children had been observed exactly a year later in a similar play situation; eight children included in the 1931–32 kindergarten group were observed in the third grade in 1935 during a work period highly similar to that of the kindergarten and one child detained a second year in the kindergarten was observed in the same physical surroundings, for a period equiva-

[1] R. E. Arrington, *Interrelations in the Behavior of Young Children*, pp. 70–81.

lent to that covered by her original observations. With the exception of this child observed twice in the same situation, only the social indices were comparable.

The consensus of studies of the constancy of behavior patterns is that consistency is a highly specific rather than a general trait. An individual may be highly consistent in certain aspects of behavior, highly variable, in others. Murphy and Murphy (36) concluded, from an extensive survey of recent research bearing on the influence of social situations on the behavior of children, that the evidence points toward "differences in the variability of traits in different individuals as well as differences in the variability of individuals taken as total personalities." Newcomb (37) differentiates three degrees or levels of consistency—specific behavior consistency, trait consistency and type consistency—and demonstrates clearly that consistency is not a unitary trait which an individual possesses or does not possess. Studying extrovert-introvert behavior traits in problem boys at a summer camp, he defined as "specific behavior consistency" the tendency to respond consistently in the same way to the same situation, as, for example, coming out of the swimming pool promptly when called day after day. "Trait consistency" was evidenced by the tendency to respond in a similar manner to different situations. A boy manifesting this type of consistency would, for example, not only come out of the swimming pool when called but would also do his share in cleaning up camp and would conform in other ways to the pattern expected of him in this situation. "Type consistency," evidence of which was rare, would be indicated if a boy showed all extrovert, and no introvert, traits, or *vice versa.*

Measurement of Consistency

The measurement of individual consistency by statistical methods presents certain definite problems. Allport and Vernon (2), in reporting a series of experimental studies in expressive movement, list the following intrinsic inadequacies of the statistical treatment of consistency.

> (1) Psychometrics cannot deal directly with single individuals; it has to approach them indirectly through standards established for a representative group. . . .

> (2) Exact experimentation is forced to oversimplify, to select some specific aspect of behavior on which all subjects can be quantitatively compared. . . .
>
> (3) When supposedly related measures fail to correlate to the degree that convention accepts as significant, the statistical method may create a false impression that the problem of consistency in personality is solved in the negative; that specificity reigns supreme. The truth may be that even low correlations may be due not to chance factors (as is usually supposed), but to the conflict of several highly consistent dispositions.[2]

They emphasize, further, the difficulty of measuring individual patterns apart from those predetermined by environmental conditions.

The most common method of measuring individual consistency in studies of young children has been that of rank-order correlation. This method was used by Arrington[3] in the original report of the nursery-school studies (4) and by Jersild (29) in a subsequent study of some of the same children, made a year later in the kindergarten. Both Arrington and Jersild, in using rank-difference correlations to measure consistency, indicated that the coefficients were unreliable because of the small number of cases on which they were based (15 in Arrington's study; 7, 10 and 11 in Jersild's three series of correlations). The probable errors of the coefficients, as given in the earlier of these studies, show clearly that the correlations mean very little. A correlation of .46 (Arrington's data for "talking to self") which has a probable error of ±.14, indicating that the probable relationship between the measures may actually be anywhere between .32 and .60, obviously does not tell us much about the consistency of the behavior. On the basis of these unreliable correlations, Jersild concluded that the technique used measured adjustments to a particular environment and to particular persons rather than basic behavior tendencies in the children.

[2] G. W. Allport and P. E. Vernon, *Studies in Expressive Movement*, pp. 47–48.

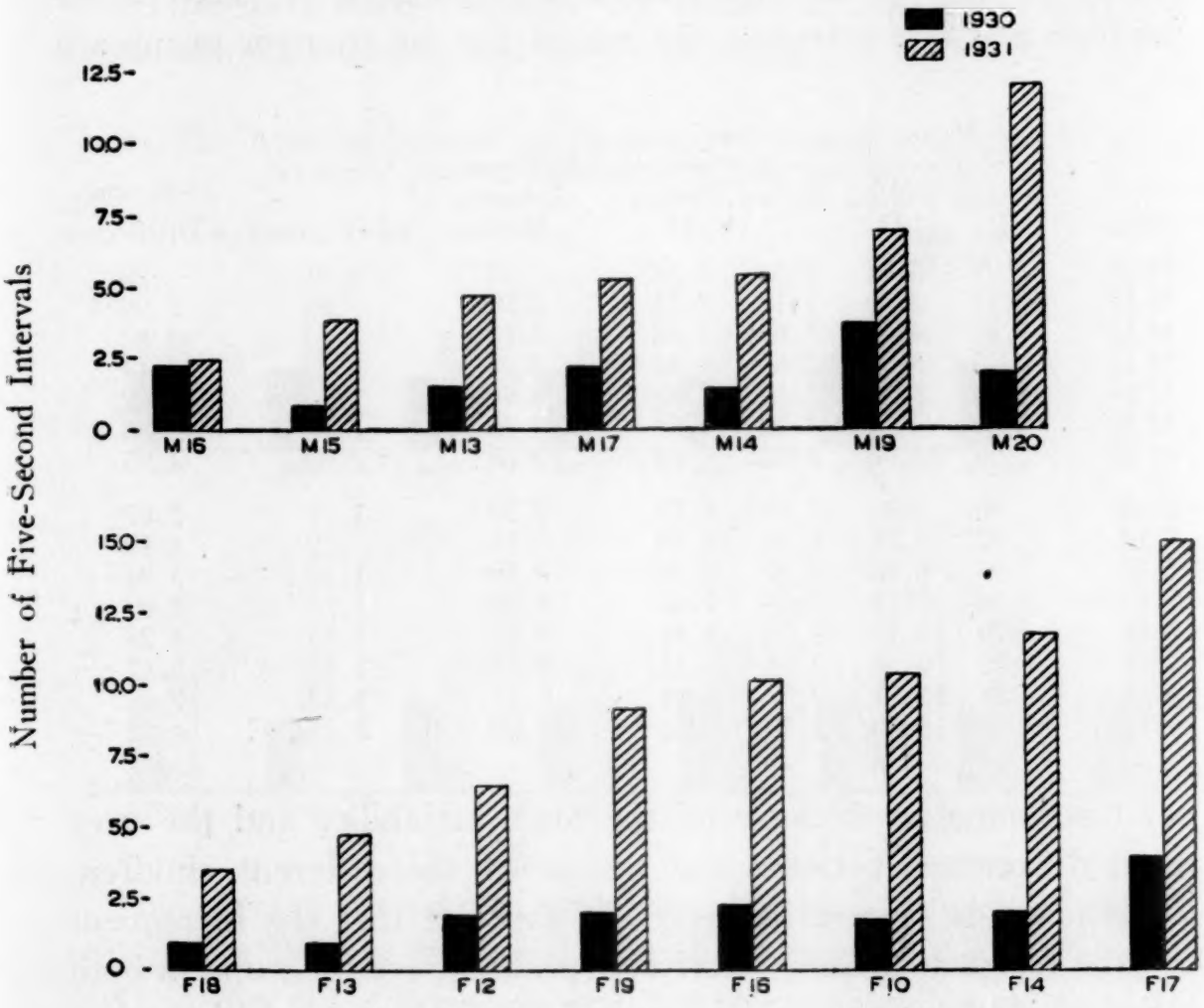
[3] Neither of the other two methods used by Arrington to show consistency or change—the amount and direction of changes in behavior between 1930 and 1931 and comparison of the decile ranking of the children in average frequency of the different types of behavior in the two observation periods—represents a very fruitful attack upon the problem. The comparison of decile ranks is subject to the same disadvantages as the rank correlation method, though to a lesser degree.

The inadequacy of the rank correlation method lies in the fact that it takes no account of change or lack of change in behavior which may be entirely consistent with the individual's previous pattern and that the differences on which the ranks are based may themselves be quite insignificant. A child having a higher than average frequency for a given behavior in his first series may show an increase in the frequency of this behavior in his second series, *i.e.*, an intensification of the earlier pattern, as compared with the group tendency to show less of the behavior, or a child may show the same absolute amount of a given behavior when the developmental tendency for the group as a whole is toward increase or decrease in that behavior. Yet these evidences of self-consistency serve only to reduce the correlations based on the rank order of the children. A high rank correlation will result only when all or most individuals in the group maintain the same position in relation to one another in both series of observations. When the groups are very small, as was the case in these studies of consistency in nursery-school children, and individual variability is so great as to make the differences between individuals negligible, failure to hold the same position with respect to a constant group cannot fairly be taken as evidence of lack of consistency. The assumption, implied in the use of rank correlations, that the children would either display a given type of behavior in exactly the same number of five-second intervals out of a possible 60 or would show proportionate increases or decreases in the behavior such that the exact order of the children with reference to other children in the group would not change is obviously absurd, in view of the inconstancy of the socio-material environment from day to day, individual differences in rate and pattern of development, and the extremely fine unit in terms of which frequency was measured.

For these reasons, the following discussion of consistency is limited for the most part to a simple comparison of the means and standard deviations of the two series of observations and a consideration of the statistical reliability of the differences. In the case of the nursery-school children, the differences presumably represent changes attributable to growth since the personnel

of the two groups was practically the same and the chief difference between the two situations was in the amount of play space available. The differences noted for the older children may reflect the influence of situational factors as well as developmental changes.

FIG. 21. AVERAGE FREQUENCY OF SPEECH TO CHILDREN FOR 15 NURSERY SCHOOL CHILDREN IN 1930 AND 1931



The Nursery-School Children

The marked increase in the frequency and range of verbal contact in the older nursery group, as compared with the younger, has been noted. All of the 15 children who were observed in two successive years talked to other children more during the second observation period than during the first. Fig. 21 shows the amount of increase per child in the 1931 as compared with the 1930 observations. The children are arranged in order of

lowest to highest frequency in the 1931 observations for the reason that the averages were more stable in the second series.[4] M 16 stands out as an exception to the general trend, showing only a very slight and statistically insignificant increase.

The following table indicates that, with the exception of this one child, all of the increases in social talkativeness are at least twice as large as the standard error of the difference between the means, in spite of the high measures of variability. Except for the high and low extremes, the means for the younger group are

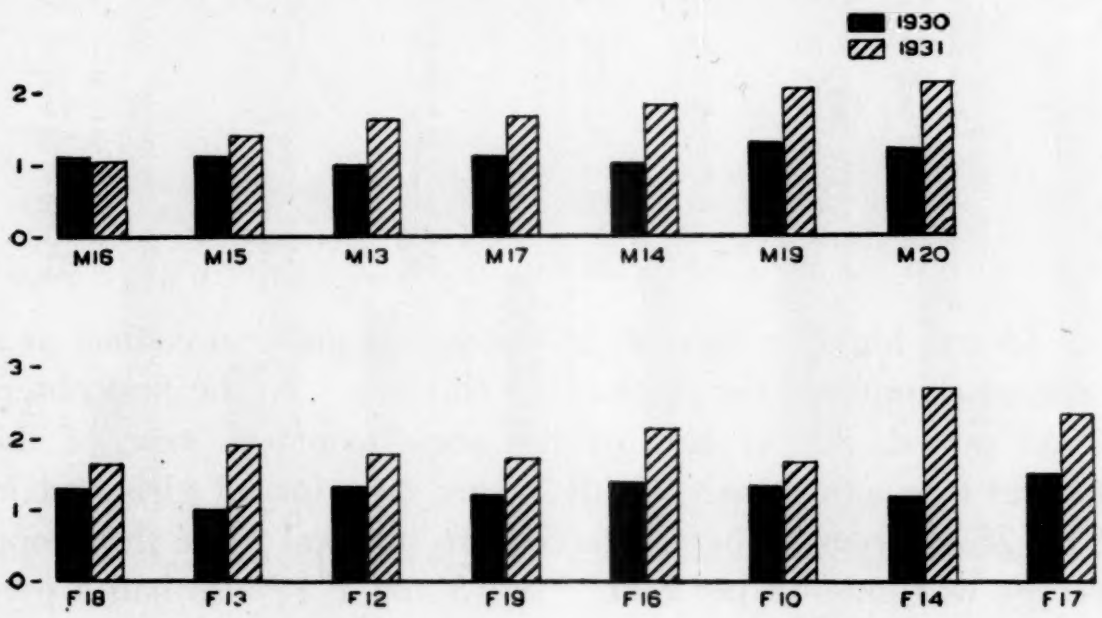
Child	Mean		σ		Difference between Means	σ Difference	Difference / σ Difference
	Period I	Period II	Period I	Period II			
M 16	2.21	2.42	3.34	3.88	.21	1.05	.20
M 15	.83	3.79	1.10	4.71	2.96	.99	2.99
M 13	1.50	4.67	1.85	3.64	3.17	.83	3.82
M 17	2.17	5.21	2.66	6.41	3.04	1.42	2.14
M 14	1.42	5.38	1.50	5.85	3.96	1.23	3.22
M 19	3.67	6.92	3.08	4.68	3.25	1.14	2.85
M 20	1.96	12.00	2.52	9.63	10.04	2.03	4.95
F 18	.96	3.46	2.09	5.57	2.50	1.21	2.07
F 13	.92	4.71	1.38	3.59	3.79	.79	4.80
F 12	1.96	6.46	2.37	5.08	4.50	1.14	3.95
F 19	2.04	9.12	3.67	7.64	7.08	1.73	4.09
F 16	2.29	10.12	2.96	8.48	7.83	1.83	4.28
F 10	1.75	10.38	2.93	6.56	8.63	1.47	5.87
F 14	2.04	11.71	2.57	6.01	9.67	1.33	7.27
F 17	3.92	15.00	5.58	9.52	11.08	2.25	4.92

not discriminative because of the high variability and the very small differences between the means of the different children. Consistency is shown, however, by the fact that the infrequent and the frequent talkers, relatively speaking, are the same in both series of observations. M 15 and M 16, F 18 and F 13 have low averages both in 1930 and in 1931 while F 17, F 16, F 14, M 19 and M 20 have relatively high averages for both observation

[4] The recent analysis of the nursery-school data, in terms of variability as well as frequency, has shown that the averages for these children were less stable than those for the public-school children. The high variability of the nursery-school children is to be attributed to the infrequency with which social behavior occurred, to inadequate sampling and to the fact that the social environment was less constant than for the older children. The personnel of the social groups, especially in the case of the younger children, was constantly changing.

periods. M 16 was the most variable, or least consistent, of the boys in both series of observations, in his day-to-day frequency of speech to other children. F 18 was the most variable of the girls in both series in her day-to-day social activity. Both of these children, however, show consistency in their general patterns of infrequent contact with other children. M 16 ranks fourth highest in the younger group but rank order means little when the differences between the means are so small and the measures of variability are uniformly high.

FIG. 22. AVERAGE NUMBER OF DIFFERENT CHILDREN ADDRESSED BY 15 NURSERY SCHOOL CHILDREN IN 1930 AND IN 1931



The average number of children addressed by each of the 15 children in 1930 is compared with the corresponding average for 1931 in Fig. 22. Here again all but the one deviate child, M 16, show an increase in the range of verbal contact, that is, they talked to more children per uniform time period in 1931 than they did in 1930. The reliability of the increases, as measured by the usual test, is indicated in the following table. With the exception of M 16, F 18 and F 10, the differences between the 1930 and the 1931 means are at least twice as great as the standard error of the difference. The differences between the means for F 18 and F 10 in the first and second periods are probably more reliable than is suggested by the low ratios in the final column of the

table since they are in the same direction as those for the rest of the group. The same children hold their positions at the high end of the group (F 17, F 16, F 14, M 20 and M 19) and at the low end are M 15, M 16 and F 18.

Child	Mean Period I	Mean Period II	σ Period I	σ Period II	Difference between Means	σ Difference	Difference / σ Difference
M 16	1.12	1.08	.35	.24	.04	.09	.44
M 15	1.12	1.40	.35	.49	.28	.12	2.33
M 13	1.00	1.63	0	.67	.63	.14	4.50
M 17	1.12	1.67	.35	.99	.55	.21	2.62
M 14	1.00	1.81	0	.81	.81	.17	4.76
M 19	1.31	2.05	.47	1.09	.74	.24	3.08
M 20	1.20	2.13	.40	.99	.93	.22	4.23
F 18	1.29	1.64	.45	.87	.35	.20	1.75
F 13	1.00	1.90	0	.94	.90	.19	4.74
F 12	1.33	1.78	.48	.91	.45	.21	2.14
F 19	1.20	1.71	.40	.67	.51	.13	3.92
F 16	1.40	2.14	.49	.96	.74	.22	3.36
F 10	1.33	1.67	.48	.98	.34	.22	1.55
F 14	1.20	2.70	.40	1.15	1.50	.25	6.00
F 17	1.53	2.33	.85	.81	.80	.24	3.33

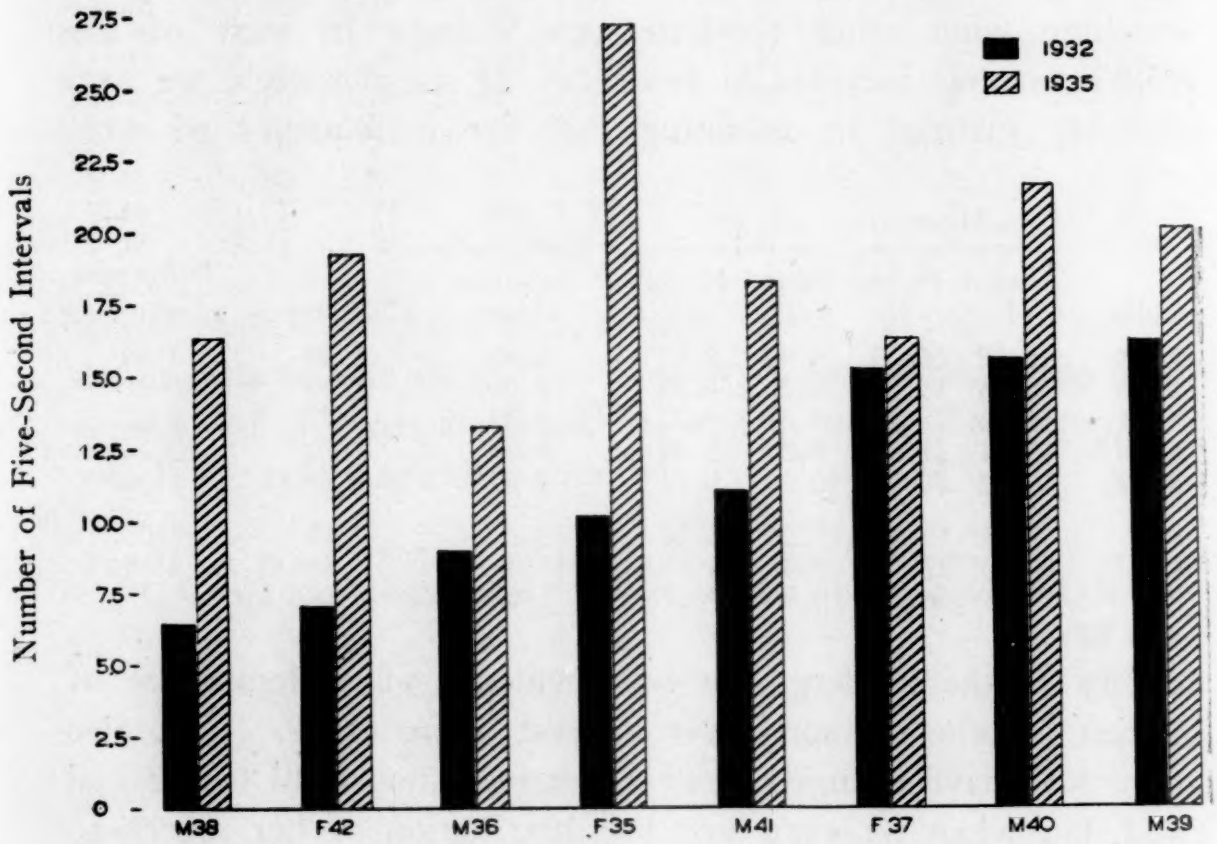
F 13 was highly consistent in her use of physical contact as a mode of communication with other children. In the first observation period, 80 per cent of her social contacts were of the physical type as compared with 37 per cent for all girls and in 1931, 28 per cent of her contacts were physical while the group average was only 14 per cent.[5] M 15 and F 18 also had a predominant proportion of physical contacts in 1930, this type of contact representing 61 per cent and 66 per cent, respectively, of their total social contacts. In the case of M 15 who had a relatively low average frequency of physical contact, the predominant proportion of physical contacts is probably explained by the fact that this child talked scarcely at all during the first observation period.

The nonsocial tendencies of M 16, M 15 and F 18 are confirmed by the fact that these children had a high proportion of nonsocial speech in the second series of observations as well as in the first, while the general trend for the group was toward decrease in proportion of nonsocial to total language. Sixty per

[5] Table X (Appendix B).

cent of M 16's language in 1930 was nonsocial, 73 per cent in 1931. For M 15, the proportion of nonsocial language was 51 per cent in 1930, 58 per cent in 1931, and for F 18, 52 per cent in 1930 and 54 per cent in 1931.[6]

FIG. 23. AVERAGE FREQUENCY OF SPEECH TO CHILDREN FOR 8 CHILDREN IN THE KINDERGARTEN IN 1932 AND IN THE THIRD GRADE IN 1935



The Kindergarten Children

Similar comparisons were made for the five boys and three girls observed in the kindergarten in 1932 and again in the third grade in 1935. Figure 23 compares the average frequency of speech to other children per five-minute observation for these children in 1932 and in 1935. The children are arranged in order of lowest to highest average in the first set of observations. Since only 24 samples were obtained for each child in 1935, the 1932 averages are based on the first 24 of the 32 samples taken in the kindergarten. All the children talked more to other children in the third grade than they did in the kindergarten and the

[6] Table XI (Appendix [redacted]).

increases shown in the following table are statistically significant, with the exception of that for F 37 and possibly for M 39. M 38, F 42 and F 35 who talked to children with only moderate frequency in the kindergarten show greater proportionate increases than the other children. F 35, it will be remembered, was the child who worked least of all the kindergarten children, spending a large proportion of her time in looking around and watching what other children were doing. In view of this child's extreme increase in frequency of social speech, we were probably justified in assuming that her infrequency of work

	Mean		σ				
Child	Period I	Period II	Period I	Period II	Difference between Means	σ Difference	Difference / σ Difference
M 38	6.42	16.33	6.46	8.63	9.91	2.20	4.50
M 36	8.96	13.25	6.26	6.81	4.29	1.89	2.27
M 41	11.00	18.25	9.87	9.32	7.25	2.77	2.62
M 40	15.54	21.58	9.28	9.44	6.04	2.70	2.24
M 39	16.12	20.04	10.30	9.71	3.92	2.89	1.36
F 42	7.08	19.25	5.27	10.70	12.17	2.43	5.01
F 35	10.12	27.17	9.36	13.25	17.05	3.31	5.15
F 37	15.17	16.25	10.86	9.07	1.08	2.89	.37

activity in the kindergarten was evidence of a dominance of interest in other persons over interest in materials. F 42 also appears to have changed from a relatively nonsocial to a social child, but when we examined the distribution of her speech to children among the different members of the group, we found that 46 per cent of her speech to children was directed toward one child and 63 per cent to this child and one other. In other words, she has changed from a relatively non-talkative child to a selectively talkative child. M 38, M 36 and M 41 were only moderately talkative children, ranking below the mean for all boys in the kindergarten and, in the third grade, talking even less than the average for first-grade boys. M 40 and M 39 were definitely social children both in the kindergarten and in the third grade.

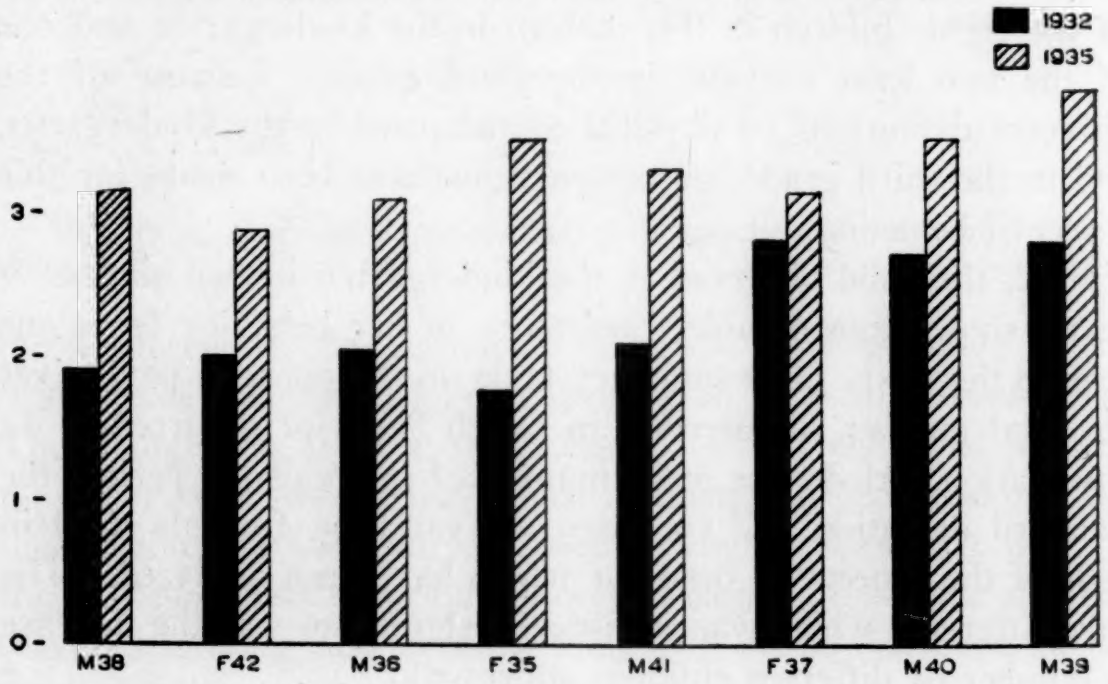
Fig. 24 compares the average number of different children addressed by each child in 1932 and in 1935. A consistent increase in the range of contact, as determined by this index, is apparent for all children. As indicated below, the increases were

statistically significant for all except F 37. M 39 and M 40 talked to more children, on the average, than the other three boys. F 42 has a lower average than any other child, which is what we

	Mean		σ				
Child	Period I	Period II	Period I	Period II	Difference between Means	σ Difference	Difference / σ Difference
M 38	1.90	3.14	1.03	1.32	1.24	.34	3.65
M 36	2.04	3.09	.98	1.13	1.05	.31	3.39
M 41	2.09	3.29	.82	1.62	1.20	.37	3.24
M 40	2.70	3.50	1.42	1.23	.80	.38	2.11
M 39	2.79	3.83	1.50	1.45	1.04	.43	2.42
F 42	2.00	2.87	.95	1.51	.87	.36	2.42
F 35	1.77	3.52	.96	1.50	1.75	.36	4.86
F 37	2.81	3.13	1.18	1.36	.32	.37	.86

would expect from the fact, already noted, that she talked predominantly to one child. F 35 shows a marked increase in the number of children addressed as well as in the frequency with which she talked to other children.

FIG. 24. AVERAGE NUMBER OF DIFFERENT CHILDREN ADDRESSED BY 8 CHILDREN IN THE KINDERGARTEN IN 1932 AND IN THE THIRD GRADE IN 1935



As a further measure of consistency in the intensiveness or extensiveness of the range of social contact, we compared for each child the maximum per cent of total "speech to children"

addressed to one child, as indicated below. With the exception of M 40 and F 42, the proportions are highly similar in the two series. We have already noted that F 42 had acquired a chum in the third grade. The fact that M 40 directed a much larger proportion of his speech to one child in the third grade may be due to a situational rather than an individual difference, to the fact that the nature of his work forced him into frequent contact with the other child.

	1932	1935
M 36	16%	16%
M 38	18%	12%
M 39	13%	17%
M 40	13%	33%
M 41	30%	27%
F 35	17%	16%
F 37	27%	28%
F 42	18%	46%

In frequency of speech to adults, three children show evidence of consistency—M 41 who has a high frequency in both series of observations, M 39 and F 35 who talked to adults with extreme infrequency in both series. M 41 was the least variable of the eight children in this pattern in the kindergarten and one of the two least variable in the third grade. Because of the different definitions of physical contact used in the kindergarten and in the third grade, no comparisons have been made for this aspect of behavior.

F 52, the child observed in the kindergarten in two successive years, shows considerable consistency in her behavior from one year to the next. The summary table on the opposite page gives the total number of intervals in which behavior occurred in 32 observation periods, the mean number of intervals per period, the standard deviation and coefficient of variation for this child in each of the aspects of behavior which have been analyzed. The only difference which was statistically significant was the increase in number of different children addressed.

The amount of evidence for or against constancy of behavior patterns, derived from these comparisons of indices based on two series of observations of 24 children, is necessarily limited. It suggests, however, that the indices of frequency and range of

social contact measured stable behavior tendencies in these children. Some showed consistency by maintaining their positions at the high or low extreme of the constant group with which they were compared. Others whose social patterns in the second observation period were distinctly different from those of the first changed in a manner consistent with their previous behavior. A girl who had conversed relatively little with other children in

Behavior	Observation Period	Total	Mean	σ	V
Speech to Children	I	343	10.72	10.91	102
	II	313	9.78	7.50	77
Speech to Adults	I	101	3.16	3.94	125
	II	133	4.16	4.41	106
Nonsocial Speech	I	101	3.16	6.07	192
	II	54	1.69	3.36	199
Physical Contact (involving materials)	I	25	.78	1.83	235
	II	14	.44	.87	198
Physical Contact (not involving materials)	I	9	.28	.57	204
	II	22	.69	2.23	323
Work Activity	I	1487	46.47	11.18	24
	II	1584	49.50	9.36	19
Use of Work Materials	I	1046	32.69	10.47	33
	II	1168	36.50	9.81	27
Number of Distractions	I	208	6.50	3.00	46
	II	179	5.59	3.01	54
		Number of Periods *	Mean	σ	V
Number of Children Addressed	I	29	1.86	.87	47
	II	27	2.63	1.31	50

* Number of observation periods in which speech was addressed to other children.

the kindergarten was found to be much more talkative in the third grade but directed her conversation to a limited audience. The change was from a nonsocial to a selectively social pattern, the latter representing the logical next step in progression from unsociability to sociability. Another kindergarten girl who, in the first observation period, showed evidence of her social interests by a striking lack of conformity with the requirements of the work situation, spending a large proportion of her time in watching others work, became the most talkative of the eight children in the third grade. Other children were characterized by consistent patterns of talking to, or not talking to, adults or of using physical contact as a means of communication.

CHAPTER VI

RELIABILITY OF THE RECORDS

Our primary objective in these observational studies was to describe the normal patterns of reaction of the children to specific aspects of a constant physical environment. The extent to which we were successful in realizing this objective depended upon two factors—the accuracy with which the original records had reproduced the behavior which actually occurred and the adequacy of the sampling of behavior within the chosen situation. The present chapter is concerned with the reliability of the records; Chapter VII, with the representativeness of the behavior samples.

The history of the methodological program of which these studies were an integral part is one of repeated efforts to improve the accuracy of observational records of behavior in life situations by controlling known sources of error.[1] To simplify the mechanical process of recording, a more stable and less cumbersome form of recording equipment was adopted in the New Haven studies than that which had been used in the nursery school. Another effort in the direction of simplifying the observer's task and thereby increasing the reliability of the records was the limitation of the number of kinds of behavior to be observed by any one person. To minimize differences among observers in interpreting the same events, the definitions of behavior were subject to a continuous process of refinement during the preliminary practice period which preceded the taking of permanent records at each successive stage of the investi-

[1] The fact that this program stressed observer control and reliability of the records more than other contemporary studies may be explained on the following grounds. First, the use of a finely graduated time scale introduced difficulties which did not have to be faced in studies using coarser time units. Second, a major goal of these studies was the standardization of the observer as a measuring instrument as a means to the ultimate facilitation of normative studies. In the third place, this program was dominantly sociological in emphasis and the need for experimentation with methods was more outstanding in this field than in others.

gation. Since interpretive disagreements were usually caused by differences in the perspective from which the child's behavior was observed by the two recorders, the observers took pains to select a vantage-point which afforded an unobstructed view of the child.

Despite these efforts, the observer's task in the studies under consideration was by no means a simple one since it involved an instantaneous classification of each item of behavior at the time it was observed, precise timing of each occurrence of relevant behavior, and an accurate recording of the appropriate symbol in the appropriate place on the record blank. In Form A of the kindergarten record, for example, (Fig. 2), it was necessary to classify the child's initial activity and each subsequent activity instantaneously as belonging in one of six mutually exclusive behavior categories, to time each change of activity to the nearest second on the time scale and to draw a line in the appropriate column to represent the duration of each kind of behavior. The observer had to note whether the child was using materials, whether the materials were related or unrelated to the child's chosen work and whether the use of materials was functional or non-functional. If no material was involved, there had to be a decision as to whether the activity was related or unrelated to the child's work and whether it belonged under self activity or social activity (*i.e.*, in the *Self* or in the *Person* column).

To record Form B of the kindergarten record, the observer had to be sufficiently familiar with the initials of 35 to 40 children to be able to record the proper symbol instantly when a child was contacted by, or came into contact with, the observed child. Each occurrence of language had to be classified at the time observed according to whether it was social or nonsocial and whether it was relevant or irrelevant to the child's work, and recorded in the appropriate column and five-second interval by the proper symbol. Each occurrence of physical contact was classified as related or unrelated to the child's work and as being initiated or received by the observed child and was recorded in the appropriate five-second interval by the symbol representing the person contacted or contacting and the initiator of the contact.

To test the reliability of these records, the usual criterion of observer agreement was applied. Lacking a "true" record of the events reported,[2] we have to depend on a comparison of one observer's fallible record with the probably equally fallible record of another. This purely relative test of accuracy in recording observed events, though our only recourse in observational studies in life situations, constitutes an extremely unsatisfactory measure of the actual reliability of the records because it gives no indication as to which record, if either, is the correct one when observers disagree and therefore affords no sure basis for differentiating between the accurate and the inaccurate observer. The measurement of reliability by observer agreement presented a peculiarly complicated problem in the studies reported in this volume because of the finely graduated time scale which introduced spurious recording errors in addition to observational and interpretive errors. Observers frequently timed the same events differently, recording an event in adjacent intervals on the time scale rather than in the same interval. The analysis of the records was further complicated by the fact that one observer might record an event as occurring within the limits of a single five-second interval while the other recorded it as continuing into the following interval. Unless the observer had indicated by his record that the two intervals of behavior represented a single occurrence (and this was done only in the last year of the program) there was no way of distinguishing between observational and timing disagreements in such instances.[3]

[2] Mechanical checks, such as a simultaneous motion picture record of the behavior, are applicable in the laboratory but impractical and of doubtful usefulness in life situations. The motion picture camera is likely to affect the normality of the behavior observed and the observer would have to view the behavior from the same perspective as the camera if the camera record were to be used as a check upon the reliability of the ordinary record.

[3] In the last year of the investigation, observers were instructed to record instances of behavior which continued from one interval to the next by a single symbol written across the border line between the intervals, or by a vertical line drawn from the initial to the approximate point on the time scale where the behavior ended. Intermittent behavior was indicated as before by repetition of the symbols in each time interval in which the behavior occurred, or by discontinuous vertical lines when the contacts were with the same person. It was hoped that this method of recording would facilitate a differentiation of items of behavior recorded in consecutive intervals which deserved a weighting

Disagreements in simultaneous records of the same behavior by two or more observers may be caused by differences in seeing, in interpreting or in recording the behavior. Two observers may actually see different events occurring at the same time or one may see an event which the other misses, because of differences in recording rhythm (sequence of looking from child to watch to record) or because of unavoidable differences in the perspective from which the child's behavior is viewed. Despite the best efforts of the observers, it was sometimes impossible to obtain a clear perspective of the child being observed, as when the child was working on the floor with his head down or at a table placed against the wall with his back turned to the room or when he was working with a large number of other children in a small amount of space.[4] Disagreements due to differences in interpreting the same events might appear on the records either as a record by one observer and no record by the other or as disagreeing records in the same or adjacent intervals. A record by one observer unconfirmed by a corresponding record in the same or an adjacent interval on the other observer's record might mean that the first observer had seen behavior which the other missed or that both had seen the behavior, one deciding to include it, the other to exclude it as not falling within the predetermined definitions.

Differences in the placement of records on the time scale, as already indicated, constituted the most serious problem since this type of disagreement camouflaged the actual agreements and the actual errors to such an extent that it was impossible to equate individual items on the paired records. When both observers had records in the same interval we could not be sure that the apparent agreement was not the spurious result of timing differences, that is, that the agreeing records did not actually represent

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of 2 (those representing two discrete occurrences of behavior) from those which received a double weighting by reason of the fortuitous circumstance that the behavior continued into the subsequent interval. All observers did not apply these rules consistently enough, however, to warrant an interpretation of the records on this basis.

[4] Records were subsequently discarded if one or both observers felt that a child's behavior had been recorded incompletely or inaccurately because of a poor perspective.

different events, and, conversely, when behavior was recorded by both but in adjacent intervals, we had no assurance that the apparently disagreeing records did not actually stand for the same event. We had assumed that absolute measures of agreement and disagreement could readily be obtained by matching the simultaneous records of two observers interval by interval but we found that both spurious agreement and spurious disagreement might result from misplacement of records on the time scale and that, for this reason, it was impossible to distinguish, in many instances, between observational, interpretive and recording errors.

Because of the difficulty of allocating disagreements between observers to their proper sources and of obtaining exact measures of the accuracy of the records of the several observers and because the whole subject of observer reliability, as applied to these studies, has been discussed in abundant detail elsewhere (**33, 55**), the present discussion is limited to a very simple analysis of the preliminary practice records of the three observers who took the kindergarten, first- and third-grade records.[5] Observer B took the Form A record for all kindergarten children and the Form A record for 15 of the first-grade children and for all third-grade children. Observer A took the Form B record for 35 kindergarten children. Observer C took the Form B record for 15 kindergarten children and the Form A record for 14 first-grade children. These observers, working in three different combinations of pairs—AB, BC and AC—took simultaneous records of the behavior of the same children over a period of one or two months at the beginning of each school year, the records being distributed in such a way as to include approximately equal proportions of easy and difficult observational situations. The set of 50 pairs of simultaneous records of the Form A type (kindergarten) taken by Observers A and B included observations of 23 different children and of 10 different kinds of work activity. Three sets of 50 records each for the three pairs of observers,

[5] It is assumed that the nursery-school records were at least as reliable as those of the older children, perhaps more so, because of the less complicated nature of the observed situations.

AB, BC and AC, have been analyzed to test the reliability of the Form B kindergarten records and the Form A record used in the first and third grades. Twenty different children were represented in the records of Observers A and B, 30, in the records of B and C and 50, in the records of A and C. Twenty-one of the 50 records for the pair AC were taken in the kindergarten and 29 in the first grade.

Before analyzing these records for agreement and disagreement, it was necessary to decide whether to compare the records at their face value or to make an arbitrary allowance for the timing differences.[6] The decision hinged upon the proportion of events out of the total number recorded which were timed differently. If an observer had such a consistent tendency to retard his records of behavior as compared with other observers that he recorded all or almost all events in the interval following that in which the paired observer made his record, it would be necessary to shift all his records upward arbitrarily to obtain an accurate picture of his agreement or disagreement with the other observer. But abundant experience had shown that this was not the case. All records were not timed differently by the two observers. Timing differences tended to occur, as would be expected, when the observed child was particularly active and several different aspects of behavior had to be recorded at the same time. An observer might begin his record on time, become retarded and catch up again before the end of the record.

By way of estimating the proportion of records which were timed alike by paired observers, a crude test was applied to the three sets of 50 records each of Form B for the pairs AB, BC and AC. To facilitate comparison, the symbols recorded by each pair of observers had been transcribed from the original record forms, separately for language and physical contact. In these transcriptions, each interval in which one observer only had a record of the behavior (language or physical contact) and each series of consecutive intervals in which one or both observers

[6] In a study of timing tendencies of observers in records of the behavior of motion picture characters (**55**), an arbitrary system of comparing each interval with the synchronous, the preceding and the following intervals on the paired observer's record had been used.

had records were ruled off into blocks to indicate that the intervals preceding and following contained no record of the behavior by either observer. An illustration of the transcription of a child's language during a five-minute period as recorded by Observers A and B is given below. Because of the difficulty of disentangling the genuine timing differences from observational and interpretive disagreements, only the most probable cases of timing agreement and disagreement were compared. These were

Interval No.	Observer A	Observer B
1		ME
2	ME	ME
3	ME	ME
4	ME	ME
5	DW	DW
—	—	—
7		M
8	M	M
9	M	M
—	—	—
22	ss	
—	—	—
30		DW
31		DW
32	DW	DW
—	—	—
48	G	
49		ss
—	—	—

the instances in which both observers had a record of the behavior in question in the first or second interval following an interval in which neither observer had a record or in the third interval following if one observer had two records preceding a record by both observers. In the above illustration, the first, second, fourth and fifth blocks were included. This arbitrary procedure obviously ascribed to timing some instances of interpretive disagreement as when a disagreeing record by one observer happened to precede two agreeing, synchronously timed records or when two disagreeing records which might or might not represent different events happened to be synchronously timed.

Of the language records for the pair AB, 80 per cent (210 out of 261 intervals compared) were timed alike; for the pair BC,

73 per cent (201 out of 274 intervals compared) and for the pair AC, 74 per cent (240 out of 325 intervals). The analysis of the records of physical contact showed that 76 per cent of the total instances compared for AB (31 out of 41 intervals), 72 per cent for BC (58 out of 80 intervals) and 55 per cent for AC (62 out of 113 intervals) were synchronously timed. Although this analysis includes only the records in which timing could legitimately be segregated from the other variables, the basis of selection of intervals to be compared was purely arbitrary and there is no reason to suppose that the sample was biased. The evidence is sufficient in any case to indicate that an arbitrary allowance for timing errors involving a shifting of the records upward, downward or in both directions would do as much injustice to the facts as would a comparison of the records at their face value.

The important points to be considered in analyzing these "reliability" records, from the standpoint of the present discussion, were (1) the extent to which the observers agreed in interpreting the same events and (2) whether the observers whose records were to be treated as comparable in subsequent analyses recorded approximately the same amount of the several kinds of behavior.

To determine the agreement of Observers A and B in interpreting the same behavior according to the sixfold classification required by Form A (kindergarten), the records of the two observers in each of the 60 five-second intervals of the 50 simultaneous observations were compared. In 2,119 of the 3,000 paired intervals, behavior was classified in the same category or categories, in 782 intervals there was agreement on at least one category and in the remaining 99 intervals the records disagreed completely. If we arbitrarily count the intervals of partial agreement as half agreement and half disagreement, we may say that the observers agreed in 2,510 out of 3,000, or in 84 per cent, of the total number of intervals. A large number of the intervals of partial agreement and disagreement undoubtedly represent differences in timing the transition between different types of activity rather than disagreements in interpretation. The problems involved in isolating timing and interpretive errors in this

type of record have been discussed in detail elsewhere (55). The fact that the record was continuous and that timing errors were irregular made it extremely difficult to identify the same instances of behavior in the paired records.

In analyzing observer agreement on the Form B record of language and physical contact, we first compared, in the same manner, interval by interval, the 50 records each for the three combinations of observers, AB, BC and AC, to see how well the observers agreed in recording the occurrence of the two types of behavior called for by the record. Since there were 50 five-minute records per pair of observers, 3,000 five-second intervals were compared for each pair. Table 4 shows the distribution of the total intervals per pair of observers by behavior recorded in each interval. All intervals in which neither observer had a record or in which the two observers agreed as to the occurrence of language or of physical contact or of both language and physical contact were counted as agreements. Intervals in which both had records of one aspect of behavior and one had a record of the other were counted as half agreement and half disagreement. On this basis, the records of A and B showed agreement in 90 per cent, those of B and C, in 84 per cent, and those of A and C, in 83 per cent, of the total intervals. Since the timing differences might produce both agreement and disagreement, it is probable that the percentages would have been substantially the same if no timing errors had been involved.

To determine how well observers agreed on the several subclassifications of language, we again compared the corresponding intervals on the paired records, disregarding the records of physical contact. This analysis showed that Observers A and B agreed exactly in their classification of language in 2,597 out of 3,000 intervals (86 per cent), B and C, in 2,518 intervals (84 per cent) and A and C, in 2,462 intervals (82 per cent). Disagreements within the category of social language, *i.e.,* instances in which observers differed as to whether speech was addressed to an individual or to a group, to a child or to the teacher or as to the identity of the child addressed, represented no more than 3 per cent of the total intervals for any pair of observers. Differences

as to type of nonsocial language—vocalizing, self speech, humming, singing, etc.—occurred in less than half of 1 per cent of the total. Disagreements as between social and nonsocial language

TABLE 4

AGREEMENT AND DISAGREEMENT OF THREE PAIRS OF OBSERVERS IN RECORDING LANGUAGE AND PHYSICAL CONTACT IN 3,000 FIVE-SECOND INTERVALS

Observers A and B

Observer A	Observer B				
	No Record	Language	Physical Contact	Language and Physical Contact	Total
No Record	2088	178	7	5	2278
Language	70	556	5	11	642
Physical Contact	12	5	24	6	47
Language and Physical Contact		11	3	19	33
Total	2170	750	39	41	3000

Observers B and C

Observer C	Observer B				
	No Record	Language	Physical Contact	Language and Physical Contact	Total
No Record	1872	203	39	11	2125
Language	144	551	5	21	721
Physical Contact	34	10	40	14	98
Language and Physical Contact	9	21	7	19	56
Total	2059	785	91	65	3000

Observers A and C

Observer A	Observer C				
	No Record	Language	Physical Contact	Language and Physical Contact	Total
No Record	1707	147	34	13	1901
Language	177	653	5	20	855
Physical Contact	46	19	48	28	141
Language and Physical Contact	23	27	13	40	103
Total	1953	846	100	101	3000

occurred in no more than 1 per cent of the total for any combination of observers. From 10 to 14 per cent of the total, for the three pairs of observers, were intervals in which one observer had a record of language unconfirmed by a corresponding record by

the other. Three per cent of the total intervals for the pair AB represent additional records by A, 7 per cent, additions by B. For the pair BC, 8 per cent represented additions by B, 6 per cent, additions by C. For the pair AC, A had additional records in 7 per cent of the total intervals and C also in 7 per cent of the total. These additional records represented either events seen by one observer and not by the other or differences in placing the same events on the time scale.

A similar analysis of agreement in classifying physical contacts showed that Observers A and B, B and C and A and C agreed that no contact occurred, or agreed exactly in classifying the contacts which did occur in 98 per cent, 94 per cent and 93 per cent of the total intervals, respectively. Disagreements in classifying contacts as subject, object or subject-object or as material or non-material occurred in 1 per cent of the total intervals for the pairs BC and AC and in less than 1 per cent for the pair AB. The additional records of physical contact were evenly divided between the twc observers for the combinations AB and BC and A had slightly more uncorroborated records than C.

The second point to be considered in analyzing the reliability of the records was the question as to whether observers recorded approximately the same amount of a given behavior for a given individual when observing identical events. Comparing the totals per record for Observers A and B for the three types of behavior discussed in Chapter IV, we found no evidence of bias toward overemphasis or underemphasis on the part of either observer in recording the total time spent in work or the frequency with which work materials were used functionally. In recording time spent in work, without regard to whether materials were used or not, Observer A had a higher total than B in 21 of the 50 records, B had a higher total than A in 21 records, and the two observers had identical totals in the remaining 8 records. In recording the frequency with which work materials were functionally used, A recorded more behavior than B in 22 records, B more than A in 23 records and both recorded the behavior in the same number of intervals in 5 records. There was a marked difference between the two observers, however, in the number of breaks in work

activity recorded. When we compared the total number of distractions from work (number of periods of continuous non-job activity) per record for A and B, we found that B recorded more breaks than A in 28 records, A more than B in 14 records, and the same number was recorded by both in 8 records. This difference was probably due partly to disagreements in interpreting the behavior and partly to a tendency on the part of B to record very brief occurrences which the other observer considered too brief to include in the record. Since Observer B took all of the Form A records in the kindergarten, the records were presumably comparable for all children and this bias on the part of one or both observers may be considered relatively unimportant.

A comparison of the totals per observer for language and physical contact, revealed that Observer B recorded more language than either of the other observers and that A recorded somewhat more of both types of behavior than C. The totals for the 50 records combined are summarized below. B's tendency

Pair of Observers	Language			Physical Contact		
	A	B	C	A	B	C
AB	675	791	...	80	80	...
BC	...	850	777	...	156	154
AC	958	...	947	244	...	201

to record more language appears very clearly when we compare the total number of intervals of "speech to children" recorded by each observer. When paired with A, B recorded more speech in 34 of the 50 records; when paired with C, in 31 out of 50 records. In the records of A and C, A recorded more speech than C in 21 records, C more than A, in 22 records and they had identical totals in the remaining 7 records. B's higher totals may be explained on the following grounds—(1) that she recorded doubtful instances which the other observers decided not to record, (2) that she consistently recorded speech beginning near the end of a five-second interval as continuing into the following interval, thus giving a double weighting to events recorded by the other observer as occurring within a single five-second interval and therefore weighted by 1, (3) that she was

the best observer and actually saw more relevant behavior than either of the others.

This tendency on the part of Observer B to record more language than either of the other observers must be taken into account as a possible contributing factor in (a) the higher frequency of speech in the first-grade group as compared with the kindergarten group, (b) the higher frequencies of speech for the third-grade children as compared with the corresponding frequencies for these children in the kindergarten, since Observer A took the kindergarten records and Observer B, the third-grade records, and (c) the higher frequencies of speech for the first-grade children in School A as compared with those for the children in the two School C groups.[7]

The average frequency of speech to children per child for the 15 children in School A was 19.68; the average per child for the 7 children in one of the two rooms of School C was 15.38, for the 7 children in the other room of School C, 12.38. In taking simultaneous records with Observer C, Observer B recorded, on the average, 15.57 intervals of speech to children per record; Observer C, 13.40 intervals per record. Thus there was an average difference of 2.17 intervals between the two observers. Since the differences between the average frequency of speech to children per child in School A and in School C (Room 1) and School C (Room 2) were 4.30 and 7.30 intervals, respectively, we may assume that there was a situational as well as an observer difference. It is also possible that individual differences in the children selected may account for some of the differences found. When the three most talkative children in Group A are dropped out, the group average drops to 16.8. We cannot conclude that the children in School A have higher frequencies than those in School C merely because one of the observers had a recording bias, because the situations were markedly different. B recorded

[7] It should be emphasized that the test of reliability in this investigation is much more stringent than is ordinarily applied in studies of this sort. It is customary to compare groups observed by different persons without any consideration of the relative reliability of the records of the different observers. Because we happened to have definite information on this point, the possibility of a bias has been suggested.

in the room where work was not required and it is to be expected that the children would talk more freely in this situation than in the other two. Furthermore, some children observed by C had frequencies as high as many of the children observed by B.

A common method of measuring observer reliability in studies of this sort has been to correlate the total units of behavior per time sample for the paired observers. This method overestimates reliability in that it measures only gross agreement, not agreement on identical items of behavior, within the time sample. Two observers may, for example, both record one occurrence of language in a five-minute observation of a given child. In terms of total frequency per five-minute period, such a record represents exact agreement, whereas one instance might have been recorded in the first minute, the other, in the fifth. Furthermore, the correlation method does not take into account constant errors that are due to bias or inaccuracy of the observer. If the error is consistently in one direction, a high positive correlation may be obtained. A further objection to the use of correlation coefficients as a test of reliability lies in the fact that the more widely the children vary in frequency of the behavior, the higher will be the correlation. For purposes of comparison with other studies, however, Pearson r coefficients of correlation between the totals of the paired observers for four categories of behavior were computed. For speech to children, r was $.97 \pm .01$ for the pair AB, and $.96 \pm .01$ for the other two pairs. The coefficients based on the paired totals of A and B for frequency of work activity, frequency of use of work materials and frequency of distractions were $.96 \pm .01$, $.95 \pm .01$ and $.88 \pm .02$, respectively. Obviously, the more exact estimate of reliability is afforded by the percentage analysis based on an interval-by-interval comparison of the records.

Summarizing this cursory analysis of the reliability of the records, we conclude that, under the complicated recording conditions of this investigation, observers agreed exactly in about 83–90 per cent of the total number of time intervals and that disagreements in interpreting behavior according to the predetermined definitions were negligible. The percentages of agree-

ment represent a more stringent test of reliability than has been applied in most studies of this sort since they represent agreement on identical items of behavior rather than mere agreement as to the total number of occurrences of a given behavior within the time period. The amount of disagreement would undoubtedly have been lower if the record had involved fewer sub-classifications of behavior since the attempt to classify behavior at the time of observation places an additional burden upon the observer, retards the recording process and, to that extent, decreases the accuracy of the records.

The unsatisfactory nature of the method of timing and recording behavior in these studies has been clearly demonstrated. Use of the stop watch and a time scale subdivided into five-second intervals introduced the following problems. The test of observer agreement was complicated by the fact that differences between observers in placing events on the time scale made it impossible to distinguish between observational, interpretive and timing errors. Behavior items of the same actual duration might receive a weighting of 1 or of 2 in subsequent analyses according to whether they were recorded as occurring within a single five-second interval on the time scale or as continuing from one interval into the next. It was difficult to translate the data recorded in terms of occurrence within time units into more realistic terms of absolute frequency or duration.

The solution of the timing problem seems to lie in the substitution of some sort of automatic device for the stop watch and mimeographed time scale. Of the various timing instruments which have been devised for use in observational studies of behavior, none fully meets the needs of this type of investigation. In the laboratory study of technical problems in observer reliability (55) made in conjunction with the studies here described, a timing machine equipped with a moving roll of paper was used by one of a battery of four observers in simultaneous recording of the behavior of characters in motion picture films. This instrument was designed to facilitate recording of the duration of successive occurrences of behavior in predefined categories and to relieve the observer of the necessity of looking at his

record, thus increasing the accuracy of the record, but was too cumbersome for use in life situations. Washburn (**58**) describes a recording device developed for use in clinical observations of social behavior.

> This device. . . consists of a Becker time-marker so mounted that it can be adjusted over the left ear like the receiver of a telephone. The well-defined ticking of the seconds by the time-marker can be clearly heard. As each second is ticked off a check mark, symbolically descriptive of the child's behavior at that moment of time, is made by the observer on a sheet of paper which is held securely on a clip lap-board. A sliding ruler which moves freely across the surface of the lap-board so orients the hand that the check marks are made in a line across the page without the removal of the observer's eyes from the subject studied. The lap-board may be held across the left arm. The sliding rule and the pencil are easily managed by the right hand, whether the observer is seated or standing. A stop watch held in the left hand enables the observer to measure accurately the length of time during which the child is under observation. This device has proved both practical and versatile. It is noiseless, easily portable and inexpensive.[8]

While this ingenious device was eminently suited to the needs of the clinical situation, it would seem to be less applicable to situations in which as many as thirty or forty persons are noisily engaged in spontaneous social interaction and in which the observer cannot remain in a stationary position. In studies of the behavior of museum visitors reported by Robinson (**50**) and Melton (**34**), observers used an inconspicuous timing instrument of about the size and appearance of an old-fashioned box camera, recording the duration of different types of behavior by pressing keys on the under side of the instrument. As many as eight different kinds of behavior could be simultaneously timed by an experienced recorder. This sort of timing device holds the most promise for studies in which an accurate record of mere frequency or duration of specific items of behavior is desired but it precludes the use of differentiating symbols. In the present investigation, the identification of individuals and types of behavior by symbols greatly enhanced the value of the data by furnishing interesting and significant qualitative information in addition to the strictly quantitative data.

While automatic timing is the ideal, the recording method used

[8] R. W. Washburn, "A Simultaneous Observation-and-Recording Method with Specimen Records of Activity Patterns in Young Children," *Psychol. Monog.*, 1936, **47**, pp. 75–76.

in this investigation has distinct advantages over the less precise methods previously used and would undoubtedly have given more encouraging results if fewer sub-classifications of behavior had been included in the record. The five-second interval had been adopted as a convenient device for making the behavior units quantitatively interchangeable, five seconds being the closest approximation we could get, within the limits of recordability, to the minimum duration of a discrete instance of speech or physical contact. It was a makeshift method in that it gave the same weighting to events lasting from one to five seconds but it served its primary purpose in furnishing a legitimate basis for comparing the incidence of certain forms of behavior in individuals and in groups and in facilitating the measurement of individual variability. The results of these studies suggest that, in further applications of the method, the length of the time sample should be gauged by the frequency of the behavior to be observed and that the length of the time interval should approximate the minimum length of a single instance of the behavior.

Whatever the method of timing behavior, there will always be disagreements in simultaneous records of behavior in life situations occasioned by differences in the perspective of the paired observers. This applies also to the checking of ordinary records by a simultaneous motion picture record. If the taking of the record involves looking away from the observed situation while making the record, as is the case in all ordinary recording, there are bound to be differences in recording rhythm which will cause disagreements in the records, one observer seeing something which the other missed when he looked away momentarily to take his record. Disagreements due to differences in interpreting behavior can be reduced to a minimum by refining definitions but even so, new situations may arise which require a reasoned rather than an automatic judgment on the part of the observer.

For the exact reproduction of behavior, uninfluenced by the fallibility of human observation, we must rely on such mechanical aids to observation as the motion picture, the sound film and the dictograph. Application of these methods to the study of behavior in life situations is, however, ordinarily prohibited by

the expense of operation and the difficulty of introducing them without affecting the "normality" of the behavior observed. That the latter difficulty can be overcome is indicated by a study of social pressure in the eating situation described in a report of studies in child development and parent education at the Cornell University Agricultural Experiment Station (**57**). Under the direction of Kurt Lewin, continuous sound film records of a group of three children with a teacher were obtained, the cameras and microphone being concealed from the children.

CHAPTER VII

REPRESENTATIVENESS OF THE SAMPLES

Whether or not our quantitative indices adequately represented the most typical behavior of the children in the situations in which we observed them depended not only on the accuracy of the records but also on a variety of other factors inherent in the method of observing, recording and sampling the behavior. The dependability of the aggregate samples of individual and group behavior is considered in this chapter from two angles: (1) from the standpoint of the results of various statistical tests of the internal consistency of the data and (2) in the light of available evidence concerning the effect of specific factors on the sampling of behavior. The records of speech to children were selected as the largest and most satisfactory body of data upon which to base this study of sampling problems, the most intensive analysis being made for the kindergarten group.[1]

Internal Consistency of the Data

In analyzing the data from the standpoint of the distribution of the frequency scores per observation, we had found that the distributions for most categories did not resemble the symmetrical bell-shaped curve characteristic of events governed by chance alone. The distributions for frequency of speech to children (Figs. 4 and 5) were distinctly J-type for the nursery groups and for the kindergarten girls and, with one exception (the first-grade boys), all showed a positive skewness, the majority of the scores falling at the low frequency end of the scale. For the category "number of children addressed," the distributions for the

[1] Since the frequencies of speech to adults, nonsocial speech and physical contact followed the same J-type pattern of distribution as those for speech to children, it was assumed that inferences concerning the reliability of the sampling of the other aspects of behavior could safely be drawn from an analysis of the one category.

youngest groups were J-type while those for the three older groups showed a progressively increasing tendency to approximate the normal type of distribution (Fig. 6). The frequencies of speech to adults, nonsocial speech and physical contact (Fig. 7) for all groups were even more heavily concentrated at the low end of the range than were those for speech to children. The distributions for frequency of work activity during the work period (Fig. 16) were also J-type but the scores were massed, as would be expected in the case of required behavior, at the high end of the scale. Those for frequency with which work materials were used in the performance of specific tasks (Fig. 17) and for frequency of distractions from work tended to approximate the normal curve. These were the kinds of behavior whose occurrence was most likely to be controlled by chance factors.

While there was no reason to expect symmetrical distributions of the frequency scores for most of these behavior categories in view of the method of recording and the fact that occurrence of the behavior was influenced by a variety of non-chance factors, the extreme J-ness, in all probability, and certainly the high proportions of 0 scores, are to be attributed to the shortness of the sample. When behavior is recorded in terms of a five-minute sample subdivided into five-second intervals, J distributions are to be expected for infrequently occurring behavior or for behavior which is required by the situation in which observations are made, the distribution being positively skewed in the former case, negatively skewed, in the latter.[2] Very young children or nonsocial persons at any age level would, for example, be expected to have J-type distributions, under the recording conditions of this study, for social language and all individuals observed in a work situation, for frequency of work activity.

The discovery that the frequency distributions were decidedly irregular led to a more intensive analysis of the stability of the samples (for speech to children) than would otherwise have been made and raised a question as to whether the usual measures of

[2] This question was discussed by the writer in some detail in a previous publication (**5**).

frequency and variability, particularly the latter (namely, means [3] and standard deviations) would adequately represent data which did not fulfill the assumptions of the normal distribution. Since the combined data for all boys and all girls in each group constituted all the information we had concerning the children, we undertook to test the reliability of the behavior samples and the adequacy of means and standard deviations as representative measures of frequency and variability by a comparison of sub-samples of the data with the total sample. The 32 observations for each kindergarten child were divided into four sub-samples of eight observations each in such a way that each of the sub-samples represented the total series,[4] and means and standard deviations were computed for each of the sub-universes of boys and girls.[5] In a similar manner, the means and standard deviations of three sub-samples of eight observations each were computed for the nursery-school and first-grade children. The number of observations in the sub-samples ranged from a minimum of 72 to a maximum of 208.[6] The measures of average frequency and variability for each of the sub-samples and for all samples combined are given below, separately for boys and girls.

[3] Means were used rather than medians because of the difficulty of determining the reliability of medians in non-normal distributions.

[4] Sample I included the first, fifth, ninth, thirteenth observations, etc., Sample II the second, sixth, tenth, fourteenth, and so on, the observations being taken in chronological sequence. This procedure was intended to eliminate the influence of any time trend affecting the 32 consecutive observations.

[5] Despite our efforts to eliminate a time trend by the method of selecting the sub-samples, we found in the means for both boys and girls in the kindergarten group an apparent trend, which, because of its persistence, would be statistically significant but which in reality is probably not significant at all. The trend for the combined observations of all boys taken in consecutive order from 1 to 32 was $.7 \pm .6$, and for girls $-1.0 \pm .7$. For the individual means of girls, the trend would be $-1/24$ or $-.04$; for boys, $.7/26$ or .03. Since there is no logical reason why every fourth record in the consecutive sets of 32 should show a higher frequency than every third, second, or first record, we can reasonably conclude that the apparent trend is a chance phenomenon. The insignificance of the trend is also indicated by the fact that the difference between the smallest and largest means is less than the expected amount for any combination of groups of 8. There was no evidence of trend in the means of the sub-samples for the younger and older children.

[6] See note 1, p. 67, *supra*.

Group	Sample	Boys		Girls	
		Mean	σ	Mean	σ
Nursery School	I	2.59	3.89	2.58	4.45
	II	2.35	3.40	1.98	3.57
Younger Group	III	2.89	3.83	2.10	3.24
	Samples Combined	2.61	3.72	2.22	3.80
	I	5.86	6.66	8.41	8.75
	II	8.62	7.94	7.07	6.47
Older Group	III	6.40	6.80	7.28	7.08
	Samples Combined	6.96	7.27	7.59	7.52
	I	12.00	10.45	9.80	9.69
	II	12.39	10.61	9.82	10.10
	III	13.06	9.94	10.12	9.38
Kindergarten	IV	13.60	9.67	10.49	9.94
	Samples Combined	12.76	10.14	10.06	9.78
	I	19.18	11.55	14.75	10.84
	II	20.23	12.17	13.68	10.51
First Grade	III	19.31	11.96	14.67	10.44
	Samples Combined	19.57	11.91	14.37	10.61

With the exception of the older nursery boys, the group having the smallest number of observations, the differences between the means of the sub-samples were not statistically significant. These results show that a sample of eight five-minute observations per child for a group of 11 or more children will give stable group measures of frequency and variability in social speech. Equally stable measures would probably result from a decrease in the number of observations per child and an increase in the number of children in the group.

Having found that the group measures of frequency and variability were essentially the same for different sub-samples of the data, we proceeded to attack the more difficult problem of determining, as best we could from the limited amount of data available, the reliability of the samples for the individual children. We first applied a chi-square test, following R. A. Fisher,[7] to find out whether the series of 32 observations for the individual children represented random samples from their respective universes in the sense that the frequencies in the separate observations making up the series were behaving as would be expected on the basis of pure chance. If this were the case, we would

[7] R. A. Fisher, *Statistical Methods for Research Workers,* 6th ed., p. 90.

expect to find a high degree of similarity in the totals of the sub-groups of 8 for each child and approximate stability in the proportion of talkativeness contributed by each child to the group total both in the main series and in the sub-series. If the series of 32 samples, in other words, covered the range of variability of the individual children and if the separate observations represented chance samples from the individual universes, it should be possible to apportion the total amount of social talkativeness among the different members of the group in highly constant fractional amounts.

The totals of the sub-samples of 8 were treated as frequency distributions and χ^2 was computed by the formula

$$\epsilon \frac{\frac{1}{a+a^1}(an^1 - a^1n)^2}{nn^1}$$

where a and a^1 were the totals per child in Samples I and II, respectively, and n and n^1 were the grand totals for all children combined in Samples I and II, respectively. The values of χ^2 computed in this manner ranged from 117 to 256, with an average of 181, for 6 pairings of sub-group totals for the kindergarten girls. Since χ^2 for n=23 (one less than the number of girls) and P=.50, is 22.34 and 181 is eight times as large as the expected value 22, the data are varying $\sqrt{8}$ or 2.8 times as much as is to be expected on the theory of pure chance.[8] The probability that the variation is due to chance alone is, therefore, extremely small and the sub-samples cannot be considered chance samples from the same universe. But χ^2 assumes perfect sampling and we know that the type of sampling involved here was entirely different from that assumed by sampling theory.

Since we could not assume that the series of 32 five-minute samples we had secured for these children represented a random sampling from a larger universe, we had to rely upon tests of the internal consistency of the data in making our estimate of reliability and had to accept the means and standard deviations of the 32 samples as the best indication we had of the measures of frequency and variability which would have been obtained if an

[8] Table XII (Appendix D).

indefinite number of samples had been taken. Another sort of test, based on Fisher's formula[9] $\frac{1}{\sigma^2} S(x-\bar{x})^2$ and designed to measure agreement between the actual amount of variation in the sub-groups and the amount to be expected on the basis of the standard deviation for the universe of 32, was applied to the individual means and standard deviations for the sub-groups. Applied to the means, this test constituted a comparison of the actual differences and the expected differences, as represented by the standard error of the difference between means of groups of 8. The differences between the means per child for paired sub-groups of 8 observations each were squared and the squares divided by $\frac{\sigma^2}{4}$ ($2\frac{\sigma^2}{N}$, where σ was the child's standard deviation for the 32 samples and N, the number of observations in the sub-sample). If the differences were running according to expectation, the sum of the quotients obtained in this manner divided by the number of children should be 1. In testing the standard deviations, a similar procedure was followed, the actual differences between the standard deviations of the sub-samples being compared with the expected differences for standard deviations of groups of 8.[10] This test gave satisfactory results on the whole since the mean of the $[(\text{diff.})^2 \div (\text{exp. diff.})^2]$ approximated the expected value of 1. A few individuals, however, varied more than would be expected in a group of 24 or 26 cases. The child F 78, for example, had a mean of 1.88 in one sample and one of 12.38 in another. M 39 had a mean of 11.38 in one sample and a mean of 25.25 in another. F 75 had a standard deviation of 1.24 in one sample and one of 10.19 in another and several other children—M 82, M 58, M 89 and F 78—differed about as much in their standard deviations for the sub-groups of 8. That such extreme variations can, and frequently do, occur in ordinary sampling is not generally recognized by many investigators.

As an additional check on these results, the actual variability

[9] R. A. Fisher, *op. cit.*, p. 103.

[10] See Tables XIII and XIV (Appendix D) for examples of this test of the individual means and standard deviations.

of the individual children in the sub-samples, measured by the scatter of the standard deviations of the groups of 8 about their mean, the standard deviation of the series of 32, was compared with the expected variability, as estimated by twice the standard error of the standard deviation for the entire distribution. We would expect to find twice as much variability in the groups of 8 as in the total series of 32. In other words, twice the standard error of the standard deviation of the total series should represent the amount of scatter in the sub-groups.[11] This test confirmed the previous results, the children who had had extremely high values being the ones whose actual variability in the small samples of 8 exceeded the variability which would have been predicted from the standard error of the standard deviation of the whole series of 32.

A further point was explored in our effort to determine how reliable the individual standard deviations were as measures of the actual variability of the children. The formula by which we regularly test the reliability of a standard deviation is

$$\sigma_{\sigma} = \frac{\sigma_{dis}}{\sqrt{2N}}$$

This formula is derived from the more general form in which σ_{σ_u} is the standard error of the standard deviation of the universe and σ_s is the standard deviation of the sample.

$$\sigma_{\sigma_u} = \sqrt{\frac{\mu_4 - \mu_2^2}{4\mu_2 \cdot N}} = \sqrt{\frac{\beta_2 - 1}{4N}}\ \sigma_s$$

The longer formula reduces to $\frac{\sigma_{dis}}{\sqrt{2N}}$ only when $\beta_2 = 3$ as in a normal distribution.[12] To test the applicability of the reduced formula to our data, we computed β_2 for the kindergarten boys and the kindergarten girls. The value for boys fell slightly below the expected value of 3 (2.9), that for girls, somewhat above the expected value (3.4). β_2 was also computed for the individual kindergarten girls although we knew that the figures

[11] Substituting for N in the formula $\frac{\sigma}{\sqrt{2N}}$, $\frac{\sigma}{\sqrt{16}} = 2\frac{\sigma}{\sqrt{64}}$.

[12] $\beta_2 = \frac{\mu_4}{\mu_2^2}$.

were practically worthless because of the extremely small number of observations (32) on which they were determined. They served to indicate, however, that in the case of a few children, the actual variability was distinctly underestimated by the formula $\frac{\sigma_{dis}}{\sqrt{2N}}$ and that, for more than half of the group, it was somewhat overestimated. F 75 had a β_2 value of 12 which, when substituted in the formula, $\sqrt{\frac{\beta_2-1}{4N}}$ times the standard deviation of the sample, would mean that the standard error of her standard deviation should be more than twice as large as when computed by the formula $\frac{\sigma_{dis}}{\sqrt{2N}}$. M 82, similarly, had a β_2 value of 14. The extremely high variability for these children is presumably attributable to unrepresentative sampling of their behavior. On the whole, however, we found that the computed values of σ_σ for the kindergarten children did not misrepresent at all seriously the actual variability. For comparative purposes, group values of β_2 were computed for the nursery-school and first-grade children. β_2 for the first-grade boys was 2.6, for the girls, 3.3. The values for the nursery-school children were considerably higher, 5 for the older nursery group and 9 and 12, respectively, for the younger boys and girls. The explanation of the high values for the younger children probably lies in inadequate sampling.

The results of these various tests answered our question as to whether means and standard deviations were adequate measures of frequency and variability in J-type distributions in the affirmative. With the exception of the nursery groups and a few of the older children for whom we had reason to believe that the sampling had been inadequate, our use of the ordinary measures of average frequency and variability in comparisons of individuals and groups appeared to be justified in spite of the fact that the frequency distributions were asymmetrical. Moreover, the empirical tests had given evidence of a considerable amount of stability in the behavior samples. While the group samples, based on a much larger number of observations, were decidedly

more dependable than those for the individual children, it was evident that a series of 32, or even 24, five-minute observations would give reasonably stable individual measures provided the samples were selected at random and were not influenced by any unusually stimulating or inhibiting factors.

The usual method of determining the reliability of results, or the internal consistency of obtained data, in time-sampling studies has been to compute a reliability coefficient by correlating individual scores or ranks based on odd and even halves of a series of observations and to predict the reliability of the whole series by means of the Spearman-Brown prophecy formula. On the basis of Parten's empirical test of the applicability of the formula to social participation scores (46), it has been generally assumed that the formula could safely be applied to any data derived by time-sampling methods.[13] That this assumption is not always justified is demonstrated by the following test applied to the data on *speech to children* for the 24 kindergarten girls in the present study. These data had been divided into four sub-samples of 8 observations each in such a way that each sample represented the total series. The means for the 24 girls in each sub-sample were correlated with the corresponding means for every other sub-sample and the means of two sets of 16 observations each were also correlated. The eight Pearson r correlation coefficients obtained in this manner are shown below, together with the Spearman-Brown predicted coefficients for each of the combinations of 8 samples.

8 Samples	16 Samples	
Obtained	Obtained	Expected (Sp.Br.)
$r_{12}=.72$		$r=.84$
$r_{13}=.80$		$r=.89$
$r_{14}=.69$	$r_{14.23}=.85$	$r=.82$
$r_{23}=.76$	$r_{13.24}=.78$	$r=.86$
$r_{24}=.67$		$r=.80$
$r_{34}=.51$		$r=.61$

r_{12} represents the relationship between the means of Samples I and II, r_{13}, that between the means of Samples I and III, etc., and $r_{13.24}$, the relationship between means based on Samples I and III combined and means based on Samples II and IV com-

[13] See pp. 29–30, *supra*.

bined. It is clear that the reliability of the prediction concerning a sample of 16 observations would depend upon the particular combination of sets of 8 samples selected; based on the first and second samples, the prediction would be reliable, on the second and third, unreliable. Because of the known variability of our data, it seemed unwise to rely upon the prediction formula as a test of reliability or consistency.

Factors Influencing Sampling of Behavior

The adequacy of the aggregate behavior sample obtained for any individual or group in these studies depended on a variety of factors peculiar to the situations in which behavior was observed, to the individuals observed and to the method of observing and recording the behavior, as, for example, the number of samples, the manner in which the samples were distributed, the total time covered by the observations, the frequency of the behavior in relation to the length of the individual sample, the size of the recording interval, the requirements of the situation and the presence of the observers. Because of the many uncontrolled variables affecting the sampling of behavior for any individual, it has been impossible to segregate the influence of many of these factors. Some evidence concerning the effect of (a) the presence of the observers, (b) the number and distribution of the samples, (c) the length of the recording interval, and (d) the kind of work engaged in by the kindergarten children during the work period, is presented below.

Presence of the Observer. A factor which must be taken into account in evaluating any information obtained by direct observation is the possible effect of the presence of the observer on the "normality" of the behavior observed. In these studies of young children, partly because of the lack of sophistication of the subjects and partly as the result of the observers' efforts to remain inconspicuous, little evidence either of unnatural restraint or of "playing up" to an audience was detected. After a brief period of natural curiosity, the observers were accepted by the children as innocuous silent members of the group whose presence was in no way related to their activities. Teachers reported that,

except at the beginning of the observation period, the children made no inquiries or comments concerning the observers' presence. The constant movement of teachers and children as well as of the observers during both the play and the work periods and the fact that the observers shifted their attention every five minutes from one child to another tended to camouflage the observational procedure to such an extent that the children showed almost no evidence of consciousness that they were being watched. This was especially true in the nursery-school and kindergarten situations where there was abundant space for free movement, less so in two of the first-grade situations where approximately the same number of children occupied smaller rooms and the observers were for this reason more conspicuous. In the case of the fourth-grade child whose records were subsequently discarded,[14] high intelligence and the fact that she was the only child observed in the room were probably responsible for the observer-consciousness noted. Even if the presence of the observers had evoked social patterns not ordinarily characteristic of a child in the situation in which he was observed, it seems reasonable to assume that the observed patterns would represent an intensification of the child's normal tendency, that the normally talkative child would show off by being more voluble and that the normally reticent child would tend to be more reticent.

Number and Distribution of the Samples. On the assumption that a more representative sampling of a child's behavior would be obtained if the short samples were distributed at regular intervals over the total observation period, an effort was made to equalize, in so far as possible, the intervals between consecutive observations. It proved impossible, however, to distribute the records of the nursery-school children and of some children in the older groups as evenly as we had hoped. The distributions for the very young children are the least regular because of the more frequent absences of the children and the multiple demands of an elaborate research program which necessitated the frequent withdrawal of children from the play group

[14] See note 11, p. 42, *supra*.

for tests or experiments. The length of the total observation period per child—the lapse of time between the first and last records of the series—also varied considerably. In order to complete the required number of records, it was frequently necessary to take two records on the same day and the number of days on which behavior was sampled varied from 12 to 24 for different children. The kindergarten records represent a much more even distribution of the samples within the total observation period. Each child was observed on 32 different days, no more than one record being taken per child per day. In the first grade, it was again necessary to take two records on the same day for a few children who had been absent for prolonged periods. The number of days observed was 18 for one child, 21 for five children, 22 for three children and 23 for one child.

In view of the many variables involved, no conclusive evidence concerning the effect of this factor could be obtained from the main body of data. In the case of children whose high variability might have been due to irregular distribution of the records, the frequency scores for observations made immediately before and immediately after an interval of several weeks showed no wider variation than those for observations made on consecutive days. Irregularity in the distribution of samples would presumably affect the total sample, however, only if there was a distinct change in the behavior pattern of the individual, or in the conditions of observation, during the observation period. It was similarly impossible to attribute high variability to an insufficient number of samples, considered apart from other factors, since a series of 24 samples gave highly stable measures for the talkative first-grade children and unstable measures for the relatively non-talkative nursery-school children. Further evidence of the difficulty of isolating the effect either of the number or of the distribution of samples is afforded by the following discussion of the results of an analysis of some additional data obtained for a few of the first-grade children.

In the course of the first-grade study, an additional series of 24 observations was obtained for 12 of the 29 children, this being the maximum number of children for whom it was possible to

lengthen the series. The initial motive in accumulating more data on these children was to test the adequacy of a series of 24 samples of behavior by comparison with a longer series. When it proved impossible, within the time available, to distribute the observations of many of the children as regularly as in the first series, it was decided to concentrate the observations of these children within a few days by taking consecutive records of one child for the entire observation period on one day, consecutive records of another, the next day, and so on, in the hope that a comparison of measures based on concentrated, as compared with distributed, observations might throw some light on the effect of the manner of distributing the samples on the measures of frequency and variability. The records of speech to children in the 48 observations for these 12 children have been analyzed in terms of two series of consecutive observations (the first 24 and the second 24, taken in chronological sequence) and in terms of an odd and an even series (the 24 odd-numbered records being compared with the 24 even-numbered records). The following table shows the number of days observed, the total intervals of speech to children in the 24 observations, the mean number of intervals per observation, the standard deviation and the coefficient of variation for each of the four series. It will be noted that, for all but two of the children, M 101 and F 92, the 48 observations covered less than 48 days. Of the ten children whose second series of observations were made on less than 24 days, six showed less variability, and four, more variability, in the concentrated than in the distributed series but since the amount of variability differed as much between the odd and even series as between the two consecutive series, the evidence is obviously inconclusive. In so far as the adequacy of a series of 24 samples is concerned, the evidence is more definite, if we consider only the measures based on the odd-even series which eliminates the possible effect of a change in behavior pattern during the period covered by the 48 samples. None of the differences between the odd and even means was statistically significant. With two exceptions (M 140 and F 129), the actual difference divided by its standard error gave a quotient of less

Child	Consecutive Series	Number of Days Observed	Total	Mean	σ	V	Odd-Even Series	Number of Days Observed	Total	Mean	σ	V
M 101	I	24	779	32.46	11.54	36	Odd	24	767	31.96	10.85	34
	II	24	686	28.58	13.01	46	Even	24	698	29.08	13.72	47
F 92	I	24	415	17.29	9.40	54	Odd	24	402	16.75	9.76	58
	II	24	447	18.62	9.94	53	Even	24	460	19.17	9.47	49
F 98	I	24	645	26.88	9.69	36	Odd	23	610	25.42	10.34	41
	II	20	563	23.46	10.53	45	Even	24	598	24.92	10.23	41
M 108	I	24	461	19.21	7.41	39	Odd	24	471	19.62	7.85	40
	II	17	489	20.37	6.85	34	Even	23	479	19.96	6.40	32
F 93	I	24	260	10.83	9.06	84	Odd	24	325	13.54	10.20	75
	II	15	434	18.08	12.83	71	Even	22	369	15.38	12.93	84
M 121	I	24	248	10.33	8.48	82	Odd	17	169	7.04	6.50	92
	II	5	114	4.75	5.41	114	Even	17	193	8.04	8.61	107
F 110	I	24	287	11.96	6.98	58	Odd	17	338	14.08	8.11	58
	II	5	382	15.92	5.99	38	Even	16	331	13.79	5.17	37
F 111	I	24	214	8.92	7.33	82	Odd	17	208	8.67	6.17	71
	II	5	171	7.12	5.28	74	Even	16	177	7.38	6.65	90
M 107	I	24	496	20.67	10.66	52	Odd	16	511	21.29	9.23	43
	II	4	488	20.33	8.49	42	Even	15	473	19.71	9.98	51
M 119	I	22	294	12.25	5.52	45	Odd	16	352	14.67	7.90	54
	II	5	366	15.25	9.58	63	Even	17	308	12.83	7.90	62
F 129	I	22	374	15.58	10.38	67	Odd	15	492	20.50	11.67	57
	II	3	518	21.58	11.83	55	Even	15	400	16.67	11.04	66
M 140	I	21	500	20.83	8.68	42	Odd	16	491	20.46	8.43	41
	II	4	408	17.00	7.48	44	Even	16	417	17.38	7.90	45

than 1. Three of the differences between the means of the two consecutive series were, however, more than twice as great as the standard error of the difference, namely, the increases in the case of F 93 and F 110 and the decrease for M 121. In the case of F 93, the increase in social speech in the second series represented an actual change in pattern; in the other two cases, the differences between the first and second series presumably reflect the effect of the manner in which the samples were distributed. The most striking finding indicated by this table is the high degree of consistency or inconsistency of certain children in all four series. M 101, F 98, M 108 and M 140 are uniformly consistent and F 93, M 121 and F 111, uniformly inconsistent in all series.

Length of Recording Interval. The five-second interval had been arbitrarily chosen as the smallest unit within which the occurrence of speech or physical contact could be accurately recorded. Since the recording interval, or time unit, has been longer than five seconds in the majority of time-sampling studies of children, it was important to see whether the size of the interval had any effect on the relative frequency of behavior in different children. To this end, the data on "speech to children" for the kindergarten girls were first retabulated in terms of ten-second intervals. Each child received a score of one for each ten-second interval in which she talked to other children and the frequency score per observation was the number of ten-second intervals in which speech to children occurred. The scores per observation based on ten-second intervals were then plotted against those based on five-second intervals for the 768 observations of the kindergarten girls. The results of this analysis, shown in Table 5, indicate a strong positive correlation between the two sets of scores, suggesting that approximately the same results would have been obtained if a ten-second interval had been used.

The same data were then retabulated in terms of fifteen-second, thirty-second, and sixty-second periods, and the total number of intervals of speech to children in 32 samples was found for each child. These totals are shown in Table 6. The 24 girls were then ranked according to the total frequency of the behavior as meas-

TABLE 5

CORRELATION BETWEEN (1) NUMBER OF FIVE-SECOND INTERVALS AND (2) NUMBER OF TEN-SECOND INTERVALS OF SPEECH TO CHILDREN PER FIVE-MINUTE OBSERVATION IN 768 OBSERVATIONS OF KINDERGARTEN GIRLS

(2) Number of Ten-Second Intervals	(1) Number of Five-Second Intervals: 0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	Total
0–	230	—	—	—	—	—	—	—	—	—	230
2.5–	67	31	—	—	—	—	—	—	—	—	98
5.0–	—	107	6	—	—	—	—	—	—	—	113
7.5–	—	22	40	—	—	—	—	—	—	—	62
10.0–	—	—	50	34	—	—	—	—	—	—	84
12.5–	—	—	1	29	9	—	—	—	—	—	39
15.0–	—	—	—	12	35	3	—	—	—	—	50
17.5–	—	—	—	—	11	19	3	—	—	—	33
20.0–	—	—	—	—	2	17	16	4	—	—	39
22.5–	—	—	—	—	—	1	8	3	1	—	13
25.0–	—	—	—	—	—	—	1	2	1	—	4
27.5–	—	—	—	—	—	—	—	—	—	3	3
Total	297	160	97	75	57	40	28	9	2	3	768

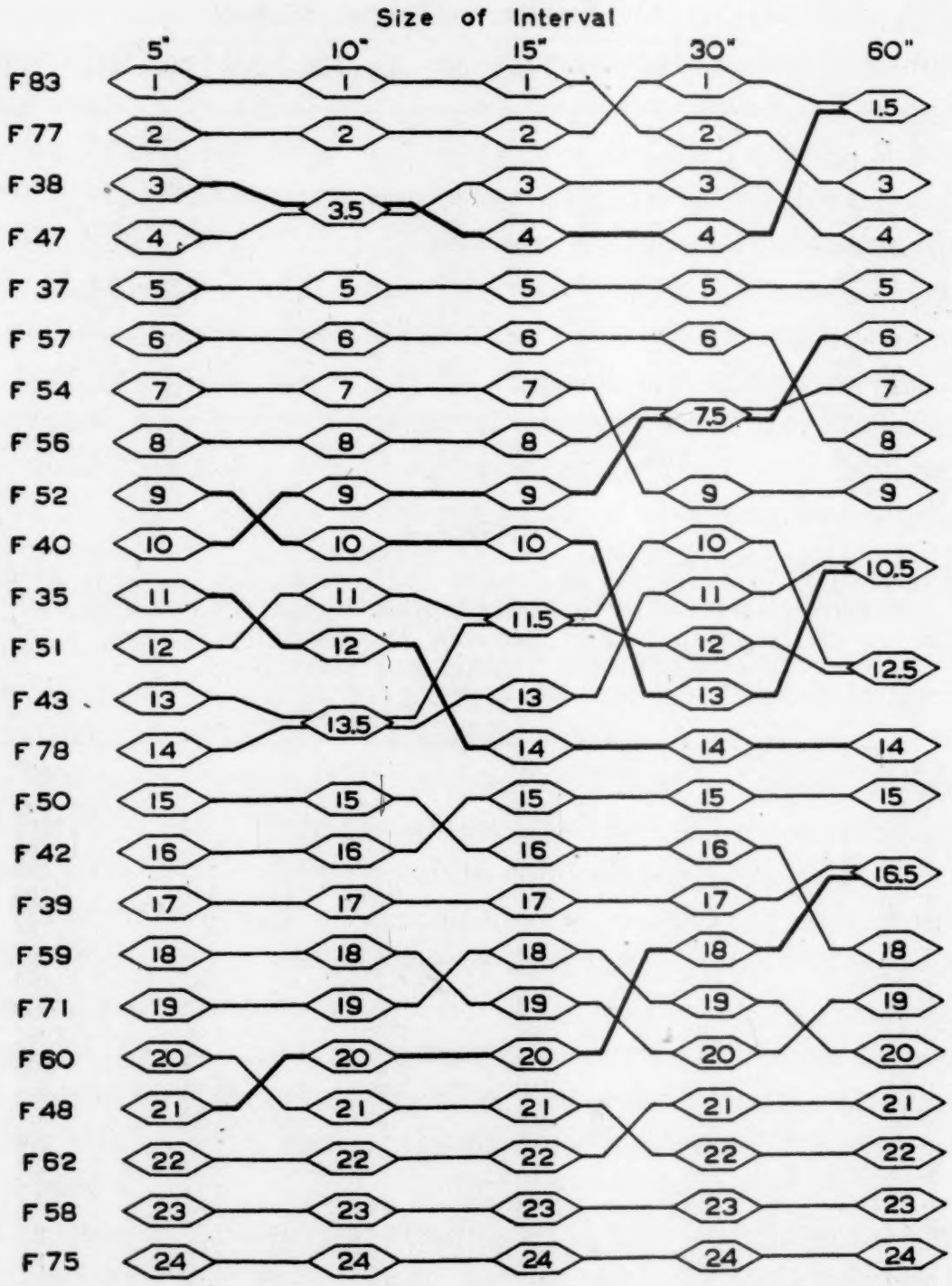
TABLE 6

TOTAL NUMBER OF INTERVALS OF SPEECH TO CHILDREN PER CHILD IN 32 FIVE-MINUTE OBSERVATIONS OF 24 KINDERGARTEN GIRLS WHEN LENGTH OF INTERVAL IS FIVE SECONDS, TEN SECONDS, FIFTEEN SECONDS, THIRTY SECONDS AND SIXTY SECONDS

Child	Size of Interval: 5″	10″	15″	30″	60″
F 83	656	468	369	225	128
F 77	601	447	353	227	133
F 38	570	410	329	209	133
F 47	532	410	332	216	125
F 37	435	337	282	185	111
F 57	429	311	253	162	97
F 54	408	291	239	152	94
F 56	359	264	226	154	100
F 52	343	256	211	136	92
F 40	334	258	215	154	103
F 35	302	230	189	135	90
F 51	300	232	191	140	91
F 43	281	216	191	137	91
F 78	266	216	190	138	92
F 50	254	203	162	117	75
F 42	243	191	164	122	86
F 39	241	186	161	115	82
F 59	214	171	143	100	73
F 71	210	163	145	104	69
F 60	189	148	122	89	63
F 48	185	155	131	109	82
F 62	157	133	117	92	68
F 58	148	118	100	75	58
F 75	69	56	47	36	27

ured in five-second, ten-second, fifteen-second, thirty-second and sixty-second intervals. These ranks, arranged in order of

FIG. 25. RANKS OF 24 KINDERGARTEN GIRLS IN TOTAL FREQUENCY OF SPEECH TO CHILDREN



highest to lowest frequency, are shown in Figure 25. The children hold almost exactly the same positions when the interval is ten seconds as when it is five seconds. Two pairs of children,

F 38 and F 47 and F 43 and F 78, are tied for the same position in the ten-second analysis and three other pairs interchange positions. The ranks based on fifteen-second intervals differ only slightly from those based on five-second and ten-second intervals. As the size of the interval increases further, however, the measures of total frequency become less discriminative and the ranks deviate more widely from the original five-second ranking. F 48, for example, has a rank of 21 in the first column and one of 16.5 in the last. F 50 drops from fifteenth to eighteenth place. F 78 changes from a rank of 14 to one of 10.5 and F 40 who ranks tenth in the first column, ranks sixth in the last. The high and low extremes of the group, however—F 83, F 77, F 38, F 47, F 37, F 75, F 58 and F 62—hold their positions regardless of the size of the interval. From this analysis, we conclude that the smaller the recording interval, the more discriminative is the measure of frequency but that there is relatively little difference between intervals of five, ten and fifteen seconds.

Kind of Work. In the kindergarten study, it was assumed that the kind of work a child happened to be doing when his turn came to be observed would not appreciably affect the total picture of his behavior during the work period. But when we analyzed the records from the standpoint of occupations, or kinds of materials used, we found that certain materials were disproportionately represented both in the records of individual children and in those for the three situational groups. Furthermore, it had become increasingly clear, in the course of continued observations during the work period, that the child's choice of materials was to a greater extent determined by situational factors than had originally been supposed. In view of these facts, it seemed important to find out whether the frequency of social and work activity varied significantly with the kind of materials used.

To explore this point, the average frequency of work activity, use of work materials and speech to children and the average number of distractions from work per five-minute observation were found for all crayon records, all block records, all sewing

records, etc. The results of this analysis, summarized below, reveal some rather marked differences in the average frequency of these aspects of behavior when different kinds of materials were used. The children were considerably more social, if we take "talking to other children" as the criterion of sociability, when they were using sand, clay and blocks than when they were using other materials. The high average for block activity is due to the fact that blocks were used for the most part by boys working in groups and that these groups of boys were very talkative. The average frequency for girls alone was about the same as the girls' average for all kinds of activity combined. Both

Materials	Number of Observations	Average Number of Five-Second Intervals			Average Number Distractions from Work
		Work Activity	Use of Materials	Speech to Children	
Crayons	277	38.58	28.77	9.82	9.31
Blocks	338	48.63	29.12	16.08	5.87
Sewing	40	42.40	36.80	9.97	6.35
Cutting	125	48.10	34.18	8.14	6.46
Sand	78	54.16	42.36	17.13	4.53
Painting	160	49.86	38.81	7.34	6.57
Clay	68	51.22	46.42	18.10	6.97
Blackboard	74	40.55	28.78	10.93	7.80
Sawing	41	43.38	28.27	9.07	6.68
Books	40	43.59	21.44	8.75	7.07
Puzzles	278	49.48	35.29	9.01	5.77

boys and girls had high averages for speech to children when using sand and clay. Since no child worked at the sand table in more than 6 of his 32 records and no child used clay in more than 5 out of 32 records, and only one child had as many as 10 records in the two categories combined, the fact that sand and clay appeared to stimulate social activity more than other materials cannot have had any appreciable effect on the total aggregate of samples. In the case of block-building for the boys, however, where the proportionate representation of block records in the total number of records ran as high as 25 out of 32 for one child and 10 or more for 15 children, the relationship between materials and behavior patterns assumes greater importance.

Two factors might have contributed to the high frequency of social activity for the block records. The blocks might have

evoked more social activity, as seems to have been the case with sand and clay, or the socially-inclined children might have chosen to work with blocks because they could work in groups. For evidence on this point, we compared the mean frequency of speech to children per observation for block records with the mean frequency for all other records combined for the 15 children who used blocks in 10 or more of their 32 observations, as indicated in the following table. All but one child had a higher average for block records than for all other records combined, M 43 being the exception. Eight of the differences between the compared

	Block Records			Other Records					
Child	No. of Records	Mean	σ	No. of Records	Mean	σ	Difference between Means	σ Difference	Difference / σ Difference
M 36	11	12.82	9.57	21	9.29	6.61	3.53	3.22	1.10
M 43	11	8.73	5.29	21	12.71	10.65	3.98	2.82	1.41
M 55	15	15.67	5.44	17	6.71	6.38	8.96	2.10	4.27
M 56	18	7.33	5.41	14	3.64	4.56	3.69	1.77	2.08
M 58	11	16.09	9.48	21	5.19	6.01	10.90	3.15	3.46
M 60	14	25.43	6.34	18	15.89	7.83	9.54	2.51	3.80
M 61	10	23.30	6.97	22	12.86	8.43	10.44	2.85	3.66
M 64	13	15.31	8.25	19	7.37	5.78	7.94	2.65	3.00
M 80	18	17.22	8.71	14	13.86	7.92	3.36	2.95	1.14
M 84	19	22.89	12.64	13	18.77	15.04	4.12	5.08	.81
M 86	25	17.12	13.57	7	3.00	2.33	14.12	2.85	4.95
M 47	20	22.30	9.19	12	19.17	6.70	3.13	2.83	1.11
M 48	11	13.64	9.88	21	8.48	7.66	5.16	3.42	1.51
M 93	21	16.62	7.18	11	11.45	5.83	5.17	2.36	2.19
F 78	10	10.80	7.97	22	7.18	6.91	3.62	2.92	1.24

means were twice, or more than twice, as large as the standard error of the difference. Since the differences are in the same direction, with the exception of the one child, they are probably all more reliable than the figures in the final column of the table indicate. It appears, therefore, that these children conversed more with other children when they were using blocks than when using other materials. There was still the question as to whether they were more talkative than other children when they were not using blocks. The mean frequency of speech to children per observation for all observations of the 12 boys who did not have a predominant proportion of block records was 11.70. Comparing the means for "other records" in the above table with this average, we find that six of the 14 boys are more

talkative and eight less talkative, on the average, than the boys who did not have an overweighting of block records. In other words, the higher frequency of speech to children for this type of activity appears to be attributable to the greater stimulus to social activity afforded by the material rather than to the fact that the children who selected blocks were the talkative children.

The average frequency of work activity was high when the materials used were sand, clay, painting and picture puzzles, low when the activity was drawing with crayons. The high frequencies are explained by the fact that these activities required more continuous manipulation of the material than other kinds

	Crayon Records			Other Records					
Child	No. of Records	Mean	σ	No. of Records	Mean	σ	Difference between Means	σ Difference	Difference / σ Difference
M 39	11	33.45	13.90	21	38.33	14.60	4.88	5.36	.91
M 40	12	29.33	11.06	20	45.10	11.65	15.77	4.13	3.82
M 43	14	38.71	10.61	18	46.00	11.78	7.29	3.97	1.84
F 35	28	28.32	9.83	4	45.75	8.26	17.43	4.53	3.85
F 38	15	36.07	6.83	17	47.24	9.46	11.17	2.90	3.85
F 40	17	42.76	10.20	15	34.60	12.75	8.16	4.12	1.98
F 39	19	35.79	12.36	13	49.85	5.83	14.06	3.26	4.31
F 42	22	39.45	8.33	10	52.00	5.04	12.55	2.39	5.25
F 43	19	37.89	11.29	13	45.38	7.62	7.49	3.35	2.24
F 60	13	46.85	8.58	19	51.63	12.23	4.78	3.68	1.30

of work and also partly by the fact that our arbitrary definitions of what constituted work may have been more comprehensive for these activities than for others. In the case of painting, the nature of the task and the fact that other children were always waiting for a chance to work at the easels probably operated to produce a higher degree of concentration on the task in hand. Crayon-drawing, on the other hand, involved a minimum of concentration and the average frequency of distractions from work was significantly higher for this type of activity than for any other. Five of the six girls who were most easily distracted had a predominant proportion of crayon records.

The possibility that some of the Group I children might have spuriously low averages for frequency of work because of the fact that a predominant number of their records were crayon records was suggested by the fact that the five girls having the

lowest averages were Group I children. We explored this point by computing the average frequency of work activity for all crayon records and the average frequency for all other records combined for the 10 children having more than 10 crayon records. The results of this analysis are summarized above. With the exception of one child, F 40, the averages for all other records combined were higher than those for crayon records alone. The statistical reliability of the differences between the means, as measured by the ratio of the actual difference to the standard error of the difference, is shown in the last column of the table. For six of the ten children, the differences between the compared means are at least twice as great as the standard error of the difference but since all but one of the differences are in the same direction, we may assume that they are all more reliable than the ratios in the last column indicate and that the children tended to work less when they were using crayons than when they were using other materials.

CHAPTER VIII

SUMMARY

In the course of an extensive research program concerned primarily with the development of reliable methods of observing social behavior, systematic observations were made of 120 children. Forty-one nursery-school children were observed during the free play period at the Child Development Institute of Columbia University in 1930–31; 50 kindergarten, and 29 first-grade, children, during the work period in three New Haven public schools in 1931–35. Fifteen of the younger nursery group were observed again a year later and eight children observed in kindergarten in 1931–32 were observed three years later in the third grade during a work period similar to that in which the original observations had been made. One child was observed two years in succession in the kindergarten.

The purpose of these studies of child behavior was to test the applicability of an observational recording technique to different age levels and to situations differing in degree of structuralization (with respect to the aspects of behavior observed) and to describe characteristic individual patterns of involvement in, or withdrawal from, active contact with materials and with persons, relating the individual patterns to the average tendency for all observed individuals of the same age and sex group. It was assumed (a) that individuals can be differentiated in terms of degree of interest in manipulation of the material and social factors in their environment or of avoidance of active contact either with materials or persons, (b) that the situations in which behavior was observed were conducive to spontaneity of action and would therefore call forth the pattern generally characteristic of the individual, and (c) that the specific items of overt behavior selected for observation were valid indices of the general tendencies to be defined. To assure comparability of the data relative to the same aspects of behavior at successive age levels, the

recording technique was retained in its original form as developed at the preschool level, with only the minimum amount of modification necessitated by the change in situation, until the end of the third year of the New Haven studies. In the final year of the program, only social behavior was observed.

The time-sampling method of controlled observation was used. A series of 24 five-minute samples of behavior per child was obtained for the nursery-school, first-grade and third-grade children; series of 32 samples each, for the kindergarten children. An additional series of 24 samples was obtained for 12 of the 29 first-grade children. The samples for each child were distributed as regularly as possible over a period of several months, no more than one record being taken for a child on a given day except when absences of the children made it necessary to take two on some days to complete the required number. Routine precautions were taken to assure as representative a sampling of each child's behavior as possible. The five-minute record was subdivided into 60 five-second intervals and behavior was recorded either in terms of duration in seconds on the time scale or in terms of occurrence at least once within a five-second interval. In subsequent analyses of the data, the five-second interval has been used as the frequency unit for all categories of behavior, the frequency score for each five-minute sample being the number of five-second intervals in which the behavior occurred.

Interest in materials was defined, in the nursery-school study, in terms of the amount of time spent in active manipulation of materials. This index proved unsatisfactory because the definition of use of material had been too broad to reveal significant individual differences. In the kindergarten, only functional use of material, defined as purposive manipulation or transportation of work materials in the performance of a given task, was included. But, in spite of the more restricted definition, this index still proved less discriminative than had been anticipated for the reason that the routine sampling procedure, planned with primary reference to controlling factors affecting the social behavior of the children, did not adequately separate the indi-

vidual pattern from that determined by factors inherent in the situation. It had been assumed that the kind of materials a child used would not affect the frequency with which he used materials functionally but the various types of materials were disproportionately represented in the records of the individual children as a result of situational as well as individual differences and different materials required different amounts of manipulation. The children in the first kindergarten group used crayons predominantly and crayon activity required less manipulation of materials than other types of work, which meant that these children had lower averages for time spent in use of work materials than those observed in the kindergarten of the other school. For these reasons, the average time spent in working at the chosen task, whether materials were being manipulated or not, proved to be a better criterion of concern with materials. A third index—the average frequency of distractions from work—was computed by counting the number of periods of non-work activity per five-minute sample and dividing the total for all samples by the number of samples. This measure, taken in conjunction with the other two, was discriminative for some children but was also affected by the unrepresentative sampling of work behavior. Apparently significant differences in the range of materials used were noted for some children.

Genuine interest in materials as such may have to be defined qualitatively rather than quantitatively or by a combination of qualitative and quantitative measures in uncontrolled situations of the sort used in this investigation because of the difficulty of eliminating the effect of the situation upon behavior. In a work situation, high indices of the sort considered here cannot be interpreted categorically as indicative of interest in materials since they may represent conformity to the requirements of the situation or an escape from social contacts. Consistently low indices probably do indicate either lack of interest in materials or a dominance of social over material interests.

Interest in persons, or in mingling with other persons, was defined in terms of the frequency and range of social contact (two types of contact, verbal and physical, being distinguished)

and the pattern of distribution of contacts among the different members of the group. The sampling of physical contacts was inadequate because of the extreme infrequency of the behavior in all age groups. As a criterion of social or asocial tendency, the frequency of physical contact was, therefore, a less satisfactory measure than had been anticipated. The criteria of sociability which proved most discriminative were the average frequency of speech addressed to other children, and the average number of different children addressed, per observation and the proportion of speech addressed to specific persons. Contacts with adults were largely determined by the requirements of the situation and were therefore discriminative for only a few children. Although speech to children as recorded in these studies was a highly discriminative measure, a distinction between initiation and response in verbal contacts would have greatly increased the discriminability of the index.

The combined data for all boys and all girls in each of the four age groups (younger nursery, older nursery, kindergarten and first-grade) were analyzed from the standpoint of age and sex differences and as a background of reference for the interpretation of individual patterns. The language data revealed clear-cut developmental patterns but the physical contact records showed no evidence of a relationship between age and the frequency of the behavior. There was a definite increase with age in the amount of speech addressed to other children accompanied by decreases in speech to adults and nonsocial speech. The number of different children addressed per constant time period also increased with age. The average frequency of physical contacts, inclusive of contacts involving materials, remained relatively constant in all but the oldest group and the increase for this group was due to the fact that a more comprehensive definition of the behavior was used in the final year of the investigation, and that greater freedom of social interaction was permitted in one of the first-grade groups. Verbal contacts predominated over physical in all age groups, the youngest group having the highest proportion of physical contact. Children addressed their conversation predominantly to children of the same sex in all except

the group of younger nursery girls. The deviation of this group from the general trend appeared to be due to the fact that Nursery School Group II contained more boys than girls. Boys were more frequently involved in social contact than girls in the kindergarten and first-grade groups. The younger nursery and kindergarten boys had a higher frequency of nonsocial speech than the girls and the kindergarten girls talked to the teachers significantly more than the boys. While the children composing the several age groups were not selected with a view to being a representative sample of all children at these age levels, the group findings can be considered fairly representative of the actual incidence of the behavior in children of these ages, the representativeness of the group indices varying with the size of the groups.

In the kindergarten work period, the children spent somewhat more than three fourths of their time, on the average, in working, and slightly over half of the time they were observed, in functional use of materials. Distractions from work activity occurred, on the average, about six times during a five-minute period. The greater frequency of work activity for the boys and the greater frequency of distractions for the girls, though statistically significant, are probably unimportant, in view of sex differences in proportionate use of certain materials and the effect of the kind of materials used on the behavior indices.

Individual patterns in social and work activity were defined in terms of the average frequency of behavior per five-minute observation and the amount of variability, as measured by standard deviations and coefficients of variation. In social behavior, individual differences were noted in total amount of social contact, in the relative extent to which verbal and physical contact were used as means of communication, in the extensiveness or intensiveness of the range of social contact and in degree of expressiveness as measured by the total amount of language. Three clear-cut social types were distinguished—the promiscuously social child who tends to make contacts, either verbal or physical, with any one who happens to be near him, the selectively social child who may be highly talkative but who limits his contacts to a

chosen few and the nonsocial child who initiates few contacts and has a narrow range of contact. Some children had a high frequency of both verbal and physical contacts, others a low frequency in both measures, and still others had a high frequency of one type combined with a low frequency of the other. The Pearson r coefficient of correlation between average frequency of speech to children and average frequency of physical contact per child was .24±.12 for the kindergarten boys, .58±.09 for the kindergarten girls. The indices of frequency and range of verbal contact were positively correlated, the coefficients being .76±.06 and .54±.10, respectively, for the kindergarten boys and girls. The fact that a few children had high frequencies of speech combined with a narrow range of verbal contact operated to reduce the size of these correlations.

Although work was a requirement of the situation in which the kindergarten children were observed, the individual children varied considerably in the amount of time spent in working. An inverse relationship between average frequency of speech to children and average frequency of work activity was found for the boys ($r=-.44\pm.11$) but there was no consistent relationship between the two indices for the girls ($r=-.03\pm.14$). The measures were positively correlated in the case of some children, negatively correlated in the case of others. The inverse relationships found for some children tend to confirm the original assumption of individual differences in degree of interest in materials *versus* persons or *vice versa.*

Comparison of the measures of frequency and variability for the first and second series of observations of the 24 children observed at different stages of development yielded definite, though limited, evidence of a considerable degree of constancy in the social patterns. The talkative children tended to remain talkative, the non-talkative to remain infrequent talkers. In the case of two children who showed marked changes in pattern, the changes were consistent with the previous pattern. The inapplicability of rank-order correlation as a means of measuring consistency when the number of cases is small and the differences between individuals are slight and statistically insignificant, was

demonstrated by the results of this analysis. Since the difficulties involved in obtaining comparable information for the same individuals at successive stages of development force us, for the most part, to deal with small groups and since the application of elaborate statistical procedures to data based on small numbers of cases tends to obscure rather than to reveal evidences of consistency, the simplest possible statistical treatment of the quantitative findings would seem to be indicated in comparing the results of successive observations or experiments on the same individuals.

The stability of the observed patterns in the situations in which they were measured must be evaluated in the light of the day-to-day variability of the individuals or groups in the manifestation of the behavior. Certain factors were found to affect the size of all the measures of variability; namely, the inconstancy of the socio-material environment, the fineness of the unit in terms of which frequency was measured (the five-second interval) and the frequency with which the behavior occurred. The measures were higher than if a coarser recording unit had been used or if observations had been made under more carefully controlled conditions and a consistent inverse relationship was found between the measures of frequency and those of variability for all aspects of behavior. The extreme variability of some children appeared to be due to the inclusion of samples which were influenced by some unusual variable in the situation. Children who were selective in their social contacts were more variable than those who contacted many individuals indiscriminately.

Fifty pairs of simultaneous records of Form A (kindergarten) taken by two observers and three sets of 50 records each of Form B (kindergarten) taken by three pairs of observers were analyzed to determine (1) the extent to which the observers agreed in interpreting the same events and (2) whether the observers whose records were treated as comparable in the analysis of the data recorded approximately the same amount of the several kinds of behavior. The finely graduated time scale, combined with the multiple classification of behavior required by

these records, seriously complicated the measurement of the reliability of the records by the usual criterion of observer agreement since differences between observers in the placement of events on the time scale made it impossible to distinguish between observational, interpretive and timing errors. Since the timing disagreements did not occur regularly in the same direction for individual observers and might cause both spurious agreement and spurious disagreement, it was assumed that an analysis of the records at their face value would afford a fair estimate of actual reliability. Observers agreed exactly in about 83–90 per cent of the total number of time intervals and disagreements in interpreting behavior according to the predetermined definitions were negligible. One observer showed a marked tendency to record more language than either of the others with whom comparisons were made.

The adequacy of the behavior samples was considered from the standpoint of the internal consistency of the data and the effect of specific factors on the behavior indices. Since the data did not fulfill the assumptions of the normal distribution, upon which depended the reliability of the measures of variability, empirical tests were applied to sub-samples of the main body of data to determine whether the samples were reasonably stable and whether means and standard deviations adequately represented the actual frequency and variability. The results of these tests indicated (a) that the group samples showed a high degree of stability, (b) that, with the exception of a few children whose high variability appeared to be due to poor sampling (inclusion of samples affected by unusual variables in the situation or extremely irregular distribution of the samples), the individual samples were relatively stable, and (c) that use of the ordinary measures of frequency and variability was justified despite the irregularity of the frequency distributions.

The available data afforded no conclusive evidence concerning the effect of the number or distribution of the samples on the aggregate behavior samples for individuals or groups. There was definite evidence, however, that situational variables did affect the behavior indices. The occupation of the child at the

time he was observed (more specifically, the kind of materials he was using) was found to have an appreciable effect on the validity of the behavior indices in terms of which we compared him with other children. If, for example, he happened to use crayons predominantly, he would have a spuriously low index for work activity and a high index for distractibility. If he used blocks predominantly, he would be likely to have a higher index of social contact than if his samples had been more regularly distributed among the different types of materials. The possible effect of the arbitrary choice of a five-second interval on the results was investigated by a retabulation of the data in terms of larger intervals. This analysis indicated that substantially the same results would have been obtained from a shorter interval or from an interval of ten or fifteen seconds.

Despite determined efforts to restrict the scope of the behavior record in the interest of greater reliability and comparability of the behavior items, the technique, as used in these studies, still attempted to cover too much ground. The simultaneous recording of different types of behavior resulted in poor sampling of some aspects and the combination of precise timing with a multiple classification of behavior complicated the interpretation of the results. But while the recording technique as a whole gave less satisfactory results than had been anticipated, the language records, which were essentially comparable throughout the investigation, not only furnished reliable indices of differential social and asocial patterns in the children but also provided the basis for a valuable by-product analysis of sampling problems. Although an honest appraisal of this program has had to include the disappointments as well as the accomplishments, it should be emphasized that the negative results of the investigation are no more serious than is to be expected in any longitudinal study which attempts to preserve its continuity and the comparability of its findings over a period of years. Moreover, as frequently happens in large-scale investigations of this sort, the incidental findings which could not have been deduced from a series of unrelated studies, supersede in importance the anticipated results.

APPENDIX A

APPENDIX A

SUPPLEMENTARY DEFINITIONS OF BEHAVIOR

Kindergarten Record

The following definitions were used in classifying behavior in Form A of the kindergarten record:

Under *Job Material* was recorded all activity involving functional manipulation[1] or transportation of job materials. Observation of material was used as a criterion of functional manipulation for all jobs except sewing, stuffing objects, and mixing paints or paste—activities which could be carried on without continuous observation of the material. Functional transportation of job material was defined as carrying job-related material to a different location where it was subsequently used or left. If an object was merely carried in the hand while the child went to get another material, and was brought back to the original location without having been used, the activity was recorded under *Job Self* rather than under *Job Material* (*e.g.*, going to closet to get paper to make pattern for fireman's hat, carrying toy hat later used as model, without looking at, or manipulating, it). Non-job material, when used for job purposes, became job material (*e.g.*, using handkerchief to push needle through cloth). Removing paint or paste from the hands was recorded under *Job Material*.

Under *Job Self* was recorded all non-functional contact with job materials which was accompanied by overt behavior indicating concern with the job. This category included such activities as the following: (1) non-functional manipulation of job material while talking about the job, (2) holding job material and observing it, (3) holding job material for another person to observe, (4) holding job material while waiting for the teacher to look at it,[2] (5) holding job material when transportation of it was forcibly interrupted by an obstacle, (6) holding job material to prevent another person from taking it away, and (7) pointing to, or touching, job material without manipulation, using the fingers, or tools related to the job. Behavior was also classified in this category when there was no contact with job material, if the child was observing material, was listening to directions or conversation concerning his work, was talking about his work, was walking to get tools needed for work, or was waiting to ask the teacher a question about the job.

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[1] Manipulation included all movement of material effected by the use of any part of the body (*e.g.*, hitching a chair up to the table by a movement of the whole body without use of the hands was considered functional manipulation of non-job material).

[2] Time spent in waiting for the teacher's recognition or for the teacher to return job material was recorded under *Job Self* if the child indicated concern with the job by looking at the material or at the teacher, or by conversation; otherwise under *Non-Job Self*.

Under *Non-Job Material* was recorded all behavior involving functional use of non-job material, such as opening and shutting closet doors, moving chairs, adjusting clothing, and manipulating, or transporting, material not related to the particular job in hand. Manipulation of job material which was extraneous to the end result of the job was recorded in the *Non-Job Material* column, but labeled job material (*e.g.*, hiding drawings under table to prevent disliked child from seeing them).

The *Non-Job Self* category included all non-functional contact with job or non-job material, such activities as the following: (1) non-functional manipulation of material while looking at others, or while conversing about matters not related to the job, (2) holding job material and looking away from it, giving no overt evidence of attention to job activity, and (3) pointing to, or touching, non-job material (*e.g.*, supporting self on chair or table, fingering clothing, rubbing hand on edge of table, twirling pencil, fingering crayons and looking away from drawing). Behavior was also recorded here when there was no contact with material and the child was walking about without any apparent destination, or was looking at other persons or at non-job material.

Under *Job Person* were recorded physical contacts with persons which were occasioned by the job, such as pushing a person away to prevent interference with work, or using physical contact as a means of attracting a person's attention to work. *Non-Job Person* included all other physical contacts, touching, embracing, hitting persons, etc., when there was no overtly observable relationship between the contact and the work activity.[1]

The distinction between *Job Language* and *Non-Job Language* in the kindergarten records was defined as follows:

Speech which was distinctly heard by the observer was classified under *Job Language* when it referred to job materials, or to any process or idea pertaining to the performance of the job; under *Non-Job Language,* when it pertained to any person, thing, or abstraction not related to the job. Non-verbal vocalization was classified under *Job* when it was obviously intended to represent the sound of a real object, a toy replica of which was being used as job material (the sound of a train, airplane, etc.); otherwise under *Non-Job.* Since the language of some children was indistinct, and since the observer frequently could not stand near enough to the child to hear his speech adequately without affecting the spontaneity of his behavior, it was necessary in many instances to infer the content of language from other overt behavior. Speech accompanied by pointing to, or demonstration of, job material, and speech addressed to the teacher, when the work activity had been interrupted for the purpose of consulting the teacher, was recorded under *Job.* Speech was recorded under *Non-Job* when the child was functionally occupied with non-job material, or when one job had been completed and another had not been undertaken. When the language was not heard and could not legitimately be inferred from other behavior, it was recorded in the *Indeterminate* category.[2]

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[1] Thomas, Loomis and Arrington, *op. cit.*, pp. 48–50.
[2] *Idem,* pp. 50–51.

The distinction between physical contacts concerned with the job and those not related to work activity in the kindergarten records was defined as follows:

> Contacts through material which were recorded under *Job* included exchange of materials related to the job (giving objects to, or taking objects from, persons), manipulation of material with persons, and transportation of material with persons. Job contacts not involving material included such activities as pushing a person away to prevent interference with work activity, touching a person to attract attention to the job, leading a person to the scene of job activity, and physical contacts with persons which were simultaneous with conversation about the job. Under *Non-Job*, contacts through material included touching persons with non-job materials (*e.g.*, pushing a doll carriage against a person intentionally, pricking a person with a needle, hitting a person with scissors) and manipulation of material with which another person was in physical contact (*e.g.*, pushing another child's peg-board on the table while the child was in contact with it, pushing another child's chair up to the table, turning the leaves of another child's picture book). Contacts not involving material, and classified under *Non-Job*, included all touching, embracing, hitting, pushing, etc., when there was no evidence of concern with work activity.[3]

First-Grade Record

Speech to Persons

By way of indicating the difficulties experienced by observers in distinguishing between speech addressed to an individual and speech addressed to a group when the name of the person was not used or when the speech was indistinct, a set of rules, formulated during the early stages of the first-grade study is presented below. These rules represented an attempt to verbalize the common sense clues which had been used, consciously or unconsciously, in making the instantaneous judgment required by the record.

> 1. If the observed child looks at a person or at the person's work while speaking, or immediately before or after speaking, it is assumed that his speech is addressed to that person although the person is not called by name.
>
> 2. If, according to Rule 1, the child has been conversing with a particular person and continues to talk while looking at his own work, it is assumed that the speech is still addressed to the same person, pro-

[3] *Idem*, p. 53.

vided that no new person has communicated with him by speech or physical contact in the meantime.

3. If the observed child speaks immediately after he has been addressed by another person or has been the recipient of a physical contact from another person, it is assumed that he is speaking to the person initiating the contact, whether he looks at him or not.

4. If the person with whom the observed child has been conversing goes to another part of the room and the observed child continues to talk without looking at any one else at his table or in his immediate vicinity, or if the child has not previously looked at or addressed any child near him, it is assumed that he is talking to himself.

5. If the child is working on a group project with two or more other children and talks about the job or gives directions concerning it without looking directly at any one person, it is assumed that the speech is addressed to the group and the speech is recorded by the symbol π.

6. If the child is working on an individual project in spatial contact with other children and looks at more than one of these children while speaking, or immediately before or after speaking, the symbol π is used.

7. If the child has been communicating with a given child and one or more other children come to inspect the observed child's work, subsequent speech is assumed to be addressed to the group and is recorded by π.

The above rules were subsequently condensed as follows: *Speech to a group* was defined as language occurring when the speaker was in spatial contact with more than one person and when there *was no* objective evidence that speech was addressed to a particular person. *Speech to a particular person* was correspondingly defined as language occurring when the speaker was in spatial contact with one or more persons and when there *was* objective evidence that speech was directed toward a particular person. *Spatial contact* was defined as sitting or standing at the same table with other persons, either working at the table or watching others who were working there or working on a group project, whether at a table or not. *Objective evidence* was defined as use of a person's name or of the second person pronoun; direct observation of a person while speaking or immediately before speaking; physical contact with a person occurring simultaneously with speech; speaker in spatial contact with only one person and that person is working on the same or a similar project; speaker in spatial contact with more than one person but has previously addressed remarks to only one person.

Physical Contact

The following types of behavior were recorded in the *Physical Contact* column:

(a) touching, caressing, embracing, kissing, pushing, pulling, hitting, kicking, a person, etc., shaking or holding hands
(b) touching or manipulating a person's clothing (tying shoe lace, etc.)
(c) contacts through material in which only one person used the material (touching a person with pencil, scissors, etc., placing material on a person's lap, moving the chair in which a person was sitting, putting paint on a person's hand with a paint brush, etc.)[4]

The following types of behavior were recorded in the *Material* column:

(a) joint manipulation or transportation of materials by observed child and another (holding ball of twine while another child made a loop with loose end of twine, opening the drawer of a desk with another child, carrying a basket with another child, taking hold of another child's drawing paper while he was drawing, taking hold of cover, or turning pages of, book which another child was using, helping a child to place a piece of a picture puzzle)
(b) coöperative exchange of materials (one person taking an object which has been offered to him by another)
(c) confiscation, or attempt at confiscation, of materials in the possession of another (taking a pencil out of another child's hand)

The definition of subject, object and subject-object contacts was elaborated as follows:

> A *subject* contact is one initiated by the observed child and one which is accompanied by no physical response (resistance or active coöperation) from the person contacted. Active coöperation is defined

[4] Contacts of this sort were distinguished by a small m above the initial of the person contacted.

as a deliberate gesture of coöperation, such as handing the material to the person who has attempted to take it. If the person contacted resists, or coöperates in, the contact, it becomes a *subject-object* contact.

An *object* contact is a contact received by the observed child which has not been preceded by any initiatory movement on his part, such as holding out an object for another person to take, and which is not accompanied by any bodily response on his part. If he responds to the contact initiated by the other person by resisting or coöperating, the behavior is recorded as a subject-object contact.

A *subject-object* contact is one in which two or more persons participate voluntarily, as in an exchange of materials, in coöperative manipulation or transportation of the same material, in mutual embraces, holding of hands, etc., or in resistance to the attempt of another person to take away materials.

In the case of an exchange of material objects, the contact is recorded as beginning at the moment when both persons are first in contact with the material and as lasting until one of the two persons relinquishes the material. The entire contact is counted as a subject-object contact whether there is simultaneous movement by both persons at the time of exchange or not. When the exchange of materials involves no actual physical contact, as in ball throwing, bean-bag throwing, or in dropping an object into another person's outstretched hand, only the receiving part of the exchange is recorded, the receiving of the material being counted as a subject-object contact with the person who has thrown or dropped the object.

Gesture

Gesture was defined as any movement of head, hands, feet or other parts of the body which was directed toward a person and which served as a means of communication with that person, either emphasizing or replacing speech. The gesture need not necessarily be accompanied by observation of the person. For example, a child might shake his head in response to a question directed toward him by another child without looking away from his work. Such movements might, or might not, be accompanied by use of material. Imitative and "showing off" movements which are social in the sense of being provoked by the presence of an audience but which do not serve as direct means of communication with specific individuals did not come within the above definition. The following are examples of this sort of gesture: going through the motions of eating, etc., while playing "house," shaking finger in imitation of another child who has made a similar movement after pricking her finger with a needle, rubbing hands together in preparation for work, pretending to

play violin. Routine gestures involved in the playing of a game (dealing cards, reaching for cards held by another, etc.) were not recorded.

The following types of behavior were recorded by the observers as social gestures falling within the above definition. The symbols used for the more frequently occurring gestures are given in parentheses. The less common gestures were described by brief notes on the record blank.

Nodding the head in affirmative or negative response to speech of another person (n)
Beckoning to a person (b)
Pointing to persons or materials (p) with hands, head, foot, etc.
Shrugging shoulders in response to speech of another person (sh)
Shaking fist at a person
Making face at a person (f), scowling, frowning, rolling eyes at a person, lifting eyebrows
Sticking out tongue at a person
Putting finger on lips as a signal to a person not to talk
Raising hand as a signal to the teacher
Standing with arms akimbo in attitude of defiance, staring at a person
Reaching out for an object in another's possession (r)
Stretching arms to demonstrate size of object being described (dem.)
Pretending to strike or hit a person (st.), shooting at, kicking at a person
Hiding from a person (h), hiding materials from a person
Emphasizing speech with hand movements (e), stamping foot, banging fist on table
Waving hand at person in indication of displeasure (w)
Holding up material for a person to observe, *i.e.*, showing material to a person (s)
Holding out material for a person to take, *i.e.*, offering material to a person—throwing ball, etc., to a person, pushing truck toward a person, without joint manipulation of the material (o)
Putting hands over ears to shut out noise
Turning back to have dress buttoned
Putting legs on chair to prevent someone from sitting in it
Moving to make room for person to sit down
Inclining head to listen to a person
Holding out hand to shake hands
Bowing to a person
Winking
Opening hands to show there is nothing in them
Holding materials out of a person's reach
Pouring water over another child's hands—holding out hands to have water poured over them
Indicating numbers by fingers (holding up three fingers)
Stepping on another child's drawing lying on floor, a gesture of retaliation
Patting self on chest

APPENDIX B

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TABLE I

Social Contact with Children (Verbal or Physical): Nursery School Boys--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred*

Number of Five-Second Intervals	Younger Group																				All Younger Boys	Older Group									All Older Boys
	M1	M2	M14	M15	M16	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20			M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	18	8	8	4	10	11	7	5	4	2	7	6	5	2	13	4	4	9	4		127	4	4	6	9	5	1		1		30
1	3	1	2	7	2	4	2		3	1	3	6	3	2	3	2	5	3	1		55	1	5	3	4	2	1	2		1	19
2	1	3	2	4	4	2	3	2	2	3	1	3		1	2	2	4	2	4		45	1	1	3	3	1	1		2	1	13
3	2		3	3	3		3	1	2	2	4		3	2	3	3	2	2	4		46	4		3		3		2	1	2	15
4		1	4	3	1	1	1	2	4	4	1	4	3	2		2	1		2		36	3	2	3	2	1		2	3	1	17
5		1	3	1	1	2	2	1	2	1	3	1	6	1			2	1	2		30	1	2					2		1	6
6		1						2	1	1		1	1	1	1	2	3		1		15		1	2			1	2	1		7
7		1			1	1	2	3	1	1	2		1	2	1	1					19		1	1		1	3	2	2	1	11
8		2					1	4	3	1	1	1				1	1		1		16	4		1	2	2		1			10
9		1		1		1	1	1		1	1			2		2	1		1		15	3	3		1	1		1	2	1	12
10		1						1		1		1	2			2		1			9		2				1		1		4
11						1	1	1			1			1							5		1		1	3	1	1		3	10
12						1								1				1	2		5					1	1	2	1	1	6
13		2						1	1	2				2							6	1			2		1	2		2	8
14				1			1							1		1	1	1			6	1					2	3		2	8
15																						1				2					3
16									1					1							2					1			1	1	3
17		1										1				1			1		4		1				1	1	3	1	7
18		1								1				1	1			1			5			2			2		1	1	6
19													2	1				1			4									1	1
20																1					1						1				1
21																											1		1	1	3
22										1									1		2						1			1	2
23										2											2						1				1
24																												1			1
25																							1					1			2
26														1							1						2				2
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31																											1				1
32																														1	1
33																														1	1
34																											1				1
38																												1			1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		456	24	24	24	24	24	24	24	24	24	216

*In Tables I-VI and IX-XI, the children are arranged in order of chronological age, as of the date of first observation, from youngest to oldest. The above table is to be read as follows: M1, the youngest boy in the younger nursery group, had no social contacts with other children in 18 of the 24 five-minute periods in which he was observed. In three periods, he either talked to, or was in physical contact with, other children in only one five-second interval out of a possible 60; in one period, he was engaged in social contact in two five-second intervals out of 60 and in the two remaining periods, in three intervals out of 60.

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TABLE I (Continued)

Social Contact with Children (Verbal or Physical): Nursery School Girls--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																	All Younger Girls	Older Group										All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19		F10	F11	F12	F15	F14	F15	F16	F17	F18	F19	F20	
0	9	9	3	7	15	11	7	8	3	5	6	4	8	4	7	6	6	120		12	2	3		9	1		10		4	41
1	7	6	1	6	6	6	2	2	5	4	5	2	4	2	10	4	4	76	2	4				2			1	1		10
2	3	3	3	1	1	6	4	3	3	5	4		3	3		3	2	47	1	3	3	2		1	6		1		3	20
3	1	2		2	2	1	4	4	4	3	1	2	1	1		3	1	32	1	1	2	1	1	1		1	2	3	1	14
4		2		2			1	1	2		1	3	3	4	1	1	1	22	1	1		4	1	2		1	3	1	1	15
5	3	1	1	2			2	3	3	2	3	1	1	2	2		3	29	1	1	2	3		4	1	1		3	2	20
6				1					1		1	2		1	1	2	1	10	1	1	4	3	2				1	2		14
7							2	1		1		1	1	1				7	1		4	1	4		1	1	2	1	2	17
8	1		1	1				1	1		2			3	1	2	1	14	2		1	1	2			1				7
9			4	1			1	1	1	1		2		1		1	2	15	1		1	2			1	1	1	2	1	10
10			5				1		1	1					1		1	10							1	1		1		3
11		1										2						3	3	1			1		1	3				9
12			2	1							1		1					5	2					2	1			2	2	9
13												2			1			3	1			2			1			1		5
14												1	1					2			2	1			1	1			2	7
15																					1		4		1		1	1	1	9
16																	1	1					2	1	3	3		1		10
17			1															1			1			1	1	1	1		1	6
18																			2					1	1	2			1	7
19														1			1	2			1		3		1	1	1		1	8
20																							2					1		3
21												1						1	1											1
22										1								1							1		2			3
23			1															1	3				1					1		5
24												1		1				2												
25			2										1					3												
26																			1									1		2
27																							1							1
28										1								1												
29																										1				1
30																												1	1	2
32																										1				1
34																								1						1
35																								1						1
38																										1				1
45																										1				1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	408	24	24	24	24	24	24	24	24	24	24	24	264

TABLE I (Continued)

Social Contact with Children (Verbal or Physical): Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M86	M84	M56	M58	M54	M59	M66	M60	M61	M47	M48	M85	M64	M35	M65	M69	M36	M58	M59	M40	M41	M95	M66	M45	All Boys
0		15	5	4	4	3	4	2	5				2	4	2	1	4	1	1	3			2	1	5	3	67
1	1	7	2	1	7	2	2		4				1	2	1				1		1					1	33
2	1	3	2		2	3		2		1	3		3		1			1		4	1		1		1	2	31
3		2	1			3	1	1	2				3	2	1		2	1	2	2	2	1	1		3		30
4	1					2	2		1		1		2	2	1	1	1	1	3	3		2	3	1	3	2	34
5	1	2	1	1	3	1	1		2	1			1	3	2		2	1		3	1	2			3		31
6		2			1	1	2		1		1		2		3	2		2	2	1	1	4	3	1		1	30
7	3				2			1	1			1	2	1	1	3	2	1	3				3	1	1		26
8	1		1		1	2					2	1	1	3		2		4		3	1		3		2	3	30
9					1						1	1	2					3	2			1	2	2	1	1	17
10	1	1	1	2	1	1		3	1	1	2				2	1	4	3	3			1	3	2	2	3	40
11	1		1		1		1	1	1	1	1	1	2		1		2	1	1		1		2	1		1	21
12	2		2	1	1	2	3	1		1	1	1		1	1	3		2	1	4	3	1	1	1	1	2	36
13		1	2			1	2	2		1	1				2	2			1	1		1	2	1	1		21
14	1		3	1		3	3	2			1	2	2		2			2	2	1				3	1	2	31
15	3		3	1	1			2	1	3	1			1	1	1	1	1			2	4	1			1	28
16				2	2			1		1	3		1	1	1	1	1		1	1	2	1					18
17	2		2		1	1	2	1						2	2		1	1			1	1	1	1			19
18	1		1	1	1	1	2	1		1	1	1			1	1	1		3	1	2	2		7		2	31
19	1		1		1			4		1		2	1			2	1			1	1			2	2	1	21
20				1			1	2		1	1	3			2	1						1		2	1		16
21			2	1		1				3	2	2	1			1		2			1	3	1		1		21
22	1		1	1	1	1	1	1	1	1	1	2	1			1	1	1				1		1	1		19
23		1		1		1	1		1	1	1	2	1			1					1		1	1	1	1	16
24	1		2		1		1	2	1	1		1	1	2	2	2			2		2			1			22
25	2					1		1	2		2	2		1							1			1		1	14
26	1			1					1		1	2			1	1	1	1	1		1	1			1		14
27	1			1			1			2	2			1		1			1			1					11
28	1								2	1					1	2	1	1			1	1					11
29	1			1				1		1		1		1		1				1				1			9
30	2									3		2	2	1							1				1	1	13
31	1			2		1				1	1			1				1								1	9
32	1		1						1	1			1				1		1		1						8
33								1						1		1	1				1						5
34				2			1		1	2	1	2											2				11
35									1		1						1				3	1					7
36							1								1		1					1					4
37				1							1	1		1					1								5
38				1					1	1				1													4
39				3														1							1		5
40												1															1
41						1			1			1												1			4
42				1						1																	2
43																	1				1						2
44																	1						1				2
45																	1										1
49				1																							1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

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TABLE I (Continued)

Social Contact with Children (Verbal or Physical): Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F55	F77	F76	F37	F38	F40	F39	F60	F42	F43	F65	F62	All Girls
0	4	4	3	6	3	2	3	3	10	4	4	21	3	1	1	5			2	6	4	3	2	2	98
1	2	4	2	2	3	1	2	1	1	1	6	3	3	1	4		1	2	1	3	2		1	4	50
2	1	2	1	3	1		2	4	2	3	1	1	4		6	1		3	2	2	2	1		8	50
3	4	3	1		2	1		1		3	2	2	1	1	3		1	2	3	2	1	1		1	35
4	2	2	5	2			1	1	4	3	3	1	1	1	1	1	2	2	3	3	1		1	2	46
5		1	2	3	1	2	1		1	1	1	1	1					1	2	1	1	4	1	1	26
6	2		2	1	2		2		3	2	2				1	1		4	3		3	3	2	3	38
7	2	2	2	4	1	1	1		1	3	2	1		1	1	1	2		3	1	1	3		2	35
8			1	1	1	1	2		2	2	1		3	1		3		1	1	2	2	3	1		28
9	1	2					1	2	2		1		2			1	1	1		1	2	2		1	20
10	1	1	2	1		1			1						1	1	2	1	3		1	3	1		20
11		2	1		2	2	1	1	1	1	2		2	1			1		2	1	3	2			25
12			1	1	1	1	1	1	2	1	2			1	3	2	1	2		3	1			3	27
13		1	1		2		3	1		1					2		1	2	2		1	1	2	2	22
14	2	1					1	3		1			3	2		2	1	2			2			1	21
15	1			1			1	1		1			3	1	1	1					3				14
16	1	1				1	1	1	1	2				2	2	1	1			1	1	1			17
17	2	1		1		2	2	1			1		1		1		1	2		1			1		17
18	1	1			2	2		1	1		1			1	1	2	1				1	1	1	1	18
19				1	1								1	2		1	1			1		2		1	11
20	1	1		1	2			1						1	1			2				1			11
21	1					1	1	2						3		2				2					12
22						1		1						1					1						4
23	1				1	1							1		2	2	3	2				4			17
24			2		1	1				1	1	1	2	2	1		1	1				1			15
25		1				2		1				1				3	1					1			9
26						1								1			1					1			4
27		1	1	1		1	1							1			1	1	1						9
28			1			1					2						1					3			8
29					1		1										1								3
30			1		1		1							2			3					1			9
31	2			1										1			1		1				2		8
32						1	1	1									1	1							5
33			2		1	1	1							1											6
34								1								1									2
35		1				1							1			1	1					2			7
36			1		1			2						1								2			7
37					1		1	1						1											4
38																1						1			2
39	1					1																			2
42					1																				1
43						1																			1
45						1																1			2
47													1												1
49																							1		1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE I (Continued)

Social Contact with Children (Verbal or Physical): First Grade Group—Distribution of 84 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys	Girls													All Girls
	M101	M140	M148	M147	M119	M108	M104	M106	M108	M130	M107	M121	M142	M106		F92	F102	F98	F94	F97	F110	F124	F95	F96	F111	F97	F112	F113	F98	F109	
0											1	1	2		4		2		5	1	2	2	1		4		5		1	24
1							1						1		2	1		1			1				1	1	2	1	2	10
2			1							1		1	2		5		1	2	1	1					1	2				8
3			2	1	2	1	1			1	1		3	2	14		1	1	1	1			1		1	1	1			9
4					1	1							2		4			3	2			1			1	2				9
5			1								1		2	1	5	2	2		2	1				1	2	4	1	1	1	17
6			1										1	3	6	2	1	3	1	3	1	2		1		1	2			1	18
7			1		1	1	1			1	1		1	3	10	1				3					1					5
8		1	1								2			2	6	1	1	1		1			1		2	2	1		1	10
9		1		1	1						2				5	1		1	1	1			1			1	1	1	1	9
10					1					2	1			1	5		1	1			2	1	1		2	2	1			13
11	1		2	1	2	1					2	2		2	12			1			2		1	1		1	1	1		9
12	1	1	1			1		1							5		1	1	1	3	3					1		1		11
13			1		2						1		2	1	6		2	1		1	1	1		1	2	1		1		1	13
14		1			2	1					1		1	1	7				1		2	4		2	2		1	2	2	16
15	1	2	1		3					1	1	2	1		12				1	1	1		1	1	1		1		1	8
16			1				1				1	2			5	1	2	2					1			1		2		11
17					1		1			1				1	3	1		1		1			2		2		1			8
18			1	1	2	2	1			1	2	1		1	13	1	2				1	1	1	1	1	1		1		2	12
19		2	1							4					7				1	1	2			1		1		1	1	8
20		1		1				1	1		1			1	7				1	1	2	1		1		1	1			9
21			1	1						1	1	1		1	6	1			1		2				1	2				7
22		1	4		1	2					1	1	2		12		1			1			1	1		1			1	1	7
23	1			2	1	1						1	1	1	1	2	1					1	1			1	1			1	8
24	1			1	1		1			1			1		7	1	1	1		2		1			1		2	1		10
25		1	2			1	1	1			1	1		1	11	3	1							4			1	2			11
26		1		2			2			1		1	2	1	12	2	1		2					2	1		1		1	1	11
27		4		2	1	2				2		1	1		13	1					1									2
28		1				1	1							1	3			1					1						1		3
29	1					2		1				1		1	7			1				1					1	1			4
30							1	1			1	1		1	5	2	1				1	1	1				1	2	1		11
31		1				2	1	2		1	1	1		1	10	1	1					2		2			2	1			9
32				1			2			1	1			1	7								1					1			2
33	1	1		2	1	1	2	1		1	1			1	12						1	2					1				4
34	2	1	1	1		1						2		1	9		1			2			1			1			1		6
35	1							1				1			3				1				2						1		4
36	2			2		1		3							8					1			2								3
37	3	1						1				2			7															2	2
38				1	1			1							3														2		2
39	1								2						3								1						2		4
40						1		1	1			1			4														1		1
41																							1			1					2
42	1								1						2																
43								1	1	1					3														1	2	3
44			1		1				1	1					4				1												1
45	2							1							3																
46	2														2									1							1
47	1			1					2						4																
48	1			1				1	1						4		1														1
49																													1		1
51		1							1	1					3								1								1
53									1						1																
55	1								1	1					3																
54		1												1	2																
56																							1								1
58																							1								1
57									1						1																
58																							1								1
Number of Observation Periods	84	84	84	84	84	84	84	84	84	84	84	84	84	84	336	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	588

TABLE II

Speech to Children: Nursery School Boys--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																			All Younger Boys	Older Group									All Older Boys
	M1	M2	M14	M13	M15	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20		M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	21	12	10	10	14	12	7	3	4	3	12	17	6	2	15	5	9	11	10	186	4	5	6	11	5	2	1	1	1	36
1	2	3	4	3	3	4	3	4	6	1	1	2	1	3	3	5	6	4	3	61	1	4	3	4	6	1	1		1	20
2	1	2	3	7	4	2	3	1	2	3	2	1	2	1	2	2	3	2	2	45	2	1	3	4	1	1	4	3	3	22
3		2	3	1	3		2	2	2	3	2	1	4	1	2	3	3	2	4	42	4	1	4		2		1	1	1	14
4		1	1	2		1	3	1	3	3	1	2	1	2	1		1		2	25	2	2	2	1	1	1		2	1	12
5		2	1			2	1	3	2	1	3		3	2		1		1	1	25	2	1			2		4		1	10
6							1	4			1	1	1	1				1	1	11	3	1	2		1	3	2	1	2	15
7								2	2	1				1		2				8	1	2	2		1		2	2	1	11
8					1		1	3	1	1	2		2	2		1	1			15	2	1		2	1		1	1		8
9						1	1		1					1		2	1	1	1	9	1	2			2		2	2	1	10
10							1						2	1		1				5		2				3	1		2	8
11		1				2		1		1										5						1			1	2
12		1												3				1		5								1	2	3
13														1						1	1			2		1	3	1		8
14							1		1	1						1				4	1					1			3	5
15																									1			2		3
16										1				1				1		3		1			1	2	1	1		6
17																										1	1	1	1	4
18															1					1			2			1			1	4
19														1						1								1		1
20																1				1						1			1	2
21																										1				1
22																										1				1
23																												1		1
24																										1				1
25																						1								1
26														1						1						1				1
28																									1			1		2
29																												1		1
31																										1				1
32																													1	1
38																												1		1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	456	24	24	24	24	24	24	24	24	24	216

TABLE II (Continued)

Speech to Children: Nursery School Girls--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																	All Younger Girls	Older Group											All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19		F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	
0	14	15	5	14	22	17	11	11	6	14	9	5	10	6	16	8	10	193		12	2	4		10	1		11		4	44
1	5	1	2	4	1	5	6	1	3	4	6	2	3	5	5	6	5	64	3	5	2			1	1		3	2		17
2	1	5	2		1	1	2	4	6	3	2	1	3	4		4	3	42		3	2	3	1	3	5		2		4	23
3		2		1		1	1	3	2	1		3	1	1		1	1	18	1	1	2	2		1		2	1	3	2	15
4	1		1	1			4	1	2	1	3	2	4	1	1	1	3	26	1		3	5	1	1		1	2	1	3	18
5	2		2	1				2	2	1	1	1		1	1		1	15	1	2		2	2	3	2	1	1	4	1	19
6		1	1					1			2	1		2		2		10	2		2	1	2		2			3		12
7			1													1		2			4	1	2			2		1	2	12
8	1		1	1					3			1	2	2				11	3		1	2	2		1	2		2	1	14
9			4	2				1				1			1	1		10			1	3					1	1		6
10			1								1							2	2	1			2	1	1	1		1	1	10
11												2	1					3	2				1		1	1				5
12																			1		1			2	3			1		8
13												2						2	3		2					1				5
14												1						1	1				2	1		1			2	7
15																						1	3		1	2	1	1	1	10
16																							1		2	1				4
17			1															1			1			1	1	1	1			5
18			1														1	2	1				1			2			1	5
19														1				1			1		2		1	1	1	1	1	8
20			1									1						2	1				1							2
21																			1											1
22			1											1				2	1							2		1		4
23																			1											1
24												1						1												
26																												1		1
27																							1							1
28																									1					1
29																										1			1	2
30																												1		1
34																									1					1
37																										1				1
39																										1				1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	408	24	24	24	24	24	24	24	24	24	24	24	264

TABLE II (Continued)

Speech to Children: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	All Boys
0		15	3	4	4	4	4	2	5				2	4	2	1	4	1	1	3			2	1	5	3	70
1	1	7	3	1	9	2	2	1	4				5	2	2				2	1	1				2	1	46
2	1	1	1			4		2		1	3		1		2			1	1	5	1	1	2		1	2	30
3	1	2	1			1	1	1	2				1	3	1		2	1	2	3	2	2	1		4		31
4		2			1	3	2		1		1		2	2	2	1	2	2	3	3		1	3	1		2	34
5	1	2	1	1	4	1	1		2	1	2		1	4			1		1	4	1	2		1	5	1	37
6		1			2	2	2		1				2		3	3		2	2	2	1	3	3			1	30
7	4		1		3				1		1	2	2	2	1	2	2	5	2	1			3	1	1	3	37
8						2		1			1	1	1	1	2	2		2	1		1	1	4	1	1	2	34
9					2			2	1	2	1		2		2		1	4	3				1	2		1	24
10	2	1	4	3	1	1	1	1		1	1				2	1	4	2	1		2	1	5	3	2	2	41
11	1		4			2		1	1	1	1	1	2	1		1	1		1	2	3	1	2	1	1	1	29
12	1				2		3	3			1	1			1	3		1	1	2	1	1	1		1	2	25
13	1		3	1		3	2	1		1	1	2	1		1	1			2	1		2		2	1		26
14	2		2	1	1	1	3	4			1		1	2	1		2	2	1		1			3		3	31
15	1		1		1			2	1	3	1			1	1	3		1	3		1	2	1	1		1	25
16	2		2	2	1	2		3		1	2	3	1	1	2	2				1	2	2		1	1		31
17	1		1	2			2			1	3	1			2		1	1		1	1			3		1	21
18	1						2	2		1		2		1		2	1					2		4	1	1	20
19	3							1		4		2	1			1	1			1	2				2		18
20			2		1	1	1					2			1		1					2		1	1		13
21		1	1	1					1	1	3	1	2	1		1		3		1		2	1	2	1		23
22	1		1	1		1	1	2	1	2	1	2	1			2						1		1			18
23				1			1		1	3	1			1		1					1	1		1		1	13
24	1						1	1	1			3	2		2	2			2	1	3	1		1		1	22
25				1					1	1	2		1		1	2		1									10
26	2			1				1	1	1	1	1		1			2		1		1	1			1		15
27	2			1			1												1			1	1				7
28	1								2	1		1						1			1						7
29										1		1		2			1		1						1		7
30	1					1				2	2	1		1	1	1						1				2	13
31			1	2				1										1				2					7
32	1								1			1	1	1			1							1			7
33				1								2					1										4
34				1			1		1	1							1										5
35							1		1		2											2	1				7
36				1						1					1								1				4
37				2								1															3
38				1					1																		2
39				1		1				1									1					1		1	6
40																	1										1
41				1					1			1															3
42																	1										1
43																						1		1			2
44																	1										1
49				1																							1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE II (Continued)

Speech to Children: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	All Girls
0	4	5	3	9	4	2	4	4	10	4	5	21	3	2	2	5			2	7	4	3	2	2	107
1	3	3	2	3	4	1	2	1	1	2	6	3	4		6		1	3	3	3	2		1	3	62
2	3	4	1	1	1	1	2	4	3	4	1	2	3		4	1		4	1	5	2	1		3	53
3	2	2	1		1		1	1		4	2	2	1	1	2		3	1	2	2	1	1		2	32
4	2	2	6	3	2	1	1		3	5	2		1	1	1	1		1	4	1	1	1	2	2	43
5			2	2	1	1	1		3		2	1	1		1	1	1	2	2	2	1	3		1	28
6	2	1	3	3	1		1		2	3	1				2	1		3	5		4	4	2	3	41
7	1	2	2	2	1	1	1		2	3	2	1	1	1			1		3	1	2	2		2	31
8	1		1	1		2	2		2		1		3	1		4		2	2	1	2	4	1		30
9	1	3			1		2	2		1	3		3	1			1	3		1	1	4	1	1	29
10	1	1	1	1		1		1	3				1			2	3		1		1	2		2	21
11	1		1	1	1	2	1	2	1	1	1			1			2		2	2	2				21
12		2	1		1		2				1		1		4	2		1		2	1		2	2	22
13	1				2		3	1		1	1			1	1		1	2	2		2	1			19
14	1	1		1		1		2					1	2	1	1		1		1	2				15
15	1					1		2	1	1			3	1	1	1				1	2				15
16		2		1		2	2	3	1	2				1	2	2	1	1		1	1	1	1	1	25
17	2			1	1						1		1	1	1		1	1				1			11
18		1			1	3							1			1	2	1			1	2	1		14
19	1				1		1	1						2	1	1						1		1	10
20	1			1	1	1	1					1		3	1			2		1			1		14
21	1				1	1		2						1		2	1			1			1		11
22					1	2								2				1	1				2		9
23			1										1		1	2	3						1		9
24			1			1		1		1	1	1	2	2	1		1	1					1		14
25		2				2					2					2							1		9
26				1										1			2		1				1		6
27	1		2		1	2								1			1	1					2		11
28	1				1		2										2								6
29	1		1	1				2						1			1	1							8
30			1		1		2							1			1					1			7
31																	1		1				3		5
32						3								1			1								5
33			1				1							1									2		5
34		1			1			1								2	1								6
35								1					1	1									1		4
36			1					1															1		3
37					1																				1
38																1									1
41						1																			1
42					1																				1
45																							1		1
47														1											1
48																							1		1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE II (Continued)

Speech to Children: First Grade Group--Distribution of 84 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys	Girls													All Girls
	M101	M140	M142	M147	M119	M105	M104	M105	M106	M120	M107	M121	M149	M108		F98	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F115	F86	F120	
0											1	2	2		5		2		5	1	2	5	1	4		5			1	24
1			1			1							1		3	1		2			1			1	1	3	1		2	13
2			1						1	1	1	1	1		6		1	2	1	2				1	2	1				11
3			1	1	3	1	1		1			4	2		14		1	1	2	1	1		1		1		1	1		11
4					1	1						2	1		5	1	2	2	2	2		1			1	4	1			16
5			1							1		1	4	2	9	1	1		2	1				1	2	2	1	1		1	13
6			3				1					1			5	2	1	2	1	2	1	2		3		2	1			1	18
7			1	1	2	1			1	2	1	1	2		12	3				3					2	2			1	13
8		3	2	1			1			2			2		12		1	2						1	1		1		1	7
9			1		2				1	2	1	1	1		9			1	1		2		1	1	1	2	2	1	2	16
10	1					1			1	1	1	1		2	8		1	2	2	1	2	1	1	2	1	1	2				16
11			2		2			1		4	1			2	12		1	1		2	2		1	1	1			1	2	12
12	1	1	1	2	1	1		1				1	1		10	1	2			1	1			1	1	1		1		9
13		1	2		1	1						2			7		1	1	•	1	1	2				1	1		1	9
14	1	1			3	1			1	1		2			10		1	2	1	1		3	1		2	1		2	2	1	17
15	1	3		1	2		2		1		2				12		1		1		1		1			1				2	7
16		1	1	1						2	1	·	1	1	8		1		1		1	1	1	1			1	1		1	9
17		1	1	2	3		1		2	1	1			2	14	1	·				1		1		1	2	1	2	.		9
18			1		1	2	1		1					1	7	1	1			1	2	1	1	1	1				2		12
19		1	1		1	1		1	2	1	2				10		1	1	2		1		1			1	1		1		9
20			2		1		1	1		1			2	1	9	2								1	1			1			5
21				1					1	1	1	1		4	9							2	1							1	4
22	1	2		1	1	2	1							1	9	2	2			1				2			1	1	2		12
23	1	1		1		2	1	1		1	1	1		2	12	1		1				1	2		1		1			1	8
24		1	1	3		1	1	1	2		1			1	12	1	1		1	1		1		1	1			2	1		10
25		1				1	1			1					4	2					1			2				2	2		10
26	1			1		1	2		1			2	1		9			1											2	1	5
27	1	1					2		2			1	2	3	12	1					1		2	2					1		8
28				2		2	1				2				8	1							2					2	1		6
29						1		1			2				5	1	1	1				2	1								6
30		2					2							1	5	2												1		1	4
31	1			2		1	1			1			1		7							2		1			1			4
32	1	2		1		1	1		2						8								2							2
33	1		1	1							1				4								1	1			1	1	1	6
34	1							2						1	4		1	1		1										1	4
35	2						2								4														2		2
36		1						2			1				4																
37	2	1		1			1	1			1				6														1	1	2
38								1							1														1		1
39				1				1			1				3								1						1		2
40							1								1																
41	1							1							2													1	1		2
42								1							1				1					1							2
43							1	1	2						4													1			1
44	1														1				1												1
45	2							1							4																
46	1														1																
47									1						1																
48								1							1														1		1
49								2							2																
51									1						1																
52								1							1																
53	1														1																
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

TABLE III

Physical Contact with Children (Material or Non-Material): Nursery School Boys--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																			All Younger Boys	Older Group									All Older Boys
	M1	M2	M14	M12	M15	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20		M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	20	8	14	12	15	20	15	6	15	5	11	9	11	13	19	13	13	18	7	244	15	15	21	21	11	4	10	13	8	118
1	2	2	3	7	1	2	6	3	1	2	5	5	2	4	2	3	4	1	4	59	2	6	1		4	4	7	3	3	30
2	1	4	3	2	2	1	2	7	2	4	2	3	4	2		4	1	2	3	49	2	1	2		1	4	1	4	3	18
3	1	2	2	1	4			1	4	2	4	1	4	1	1	1	2	1	4	36	2	1			1	6	1		3	14
4		1	1					2		1	1	3		1		1	1		2	14	1	1		1			1	3		7
5		1	1		1	1	1	3	1		1	1	1	1			2			15	1				1	2	2			6
6		1			1			1	1	3				1	2				1	11					2	2	1	1	3	9
7		1		1						1						1				4					3	1	1			5
8										1			1	1						3										
9		3		1				1		1										6	1			2	1					4
10										1		1								2									1	1
11										1									1	2										
12																			1	1						1			1	2
13																1		1		2										
14												1	1				1			3										
16										1										1									1	1
17		1																		1										
18										1								1		2										
19																			1	1										
28																													1	1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	456	24	24	24	24	24	24	24	24	24	216

TABLE III (Continued)

Physical Contact with Children (Material or Non-Material): Nursery School Girls--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																	All Younger Girls	Older Group										All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19		F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	
0	15	15	9	13	16	17	10	16	11	9	15	14	14	12	12	16	12	228	13	16	15	13	10	16	14	10	16	13	12	152
1	7	5	3	4	6	5	1	4	6	3	5	5	6	4	6	2	3	77	6	5	3	2	4	4	4	5	3	2	5	43
2	2	2		2	1	2	7	1	2	5		3	1			2	3	33	2	1	3	1	5			3		3	1	19
3			2	4	1		2	2	2	2	1	1	1	5	2	2		27			1	1	2	2	2			2	2	12
4			2				2		1		2	1		1				9				1	1	1			1	1		5
5		1	1					1		1	1				1		1	7			2	3					1	1	1	8
6		1	2	1			1								1		1	7	1			1	1		1	1	1	1	1	8
7			1											1	1			3				1			1	2			1	5
8			3							1								4										1		1
9										1			1	1			2	5								1				1
10			1				1										1	3						1						1
11																			1							1				2
12																			1						1					2
13															1			1												
14																						1	1		1					3
15																	1	1											1	1
21													1					1												
22										1								1								1				1
26										1								1												
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	408	24	24	24	24	24	24	24	24	24	24	24	264

TABLE III (Continued)

Physical Contact with Children (Material or Non-Material): Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M83	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M45	All Boys
0	7	21	10	14	14	12	27	6	22	7	12	2	12	15	8	11	16	17	16	16	11	20	17	8	14	16	351
1	8	6	8	9	3	4	2	8	6	1	7	6	10	4	6	6	3	11	3	7	5	5	7	4	5	10	154
2	5	3	4	4	1	3	2	1	2	4	2	8	5	3	2	4	2	2	3	3	6	1	1	4	7	1	85
3	5	1	2	2	3	3		5	1	4	3	3	1		3	1	3	1			3	5	1	7	3	1	61
4	1		1	2	3	3		4		5	5	6	2	2	5	1	2		2	2	1	1	3	3		2	56
5	2		3		4	1	1	3	1	3		4		3	2	2	1	1	1		1			3	1	1	38
6	1		1	1	1	2		3		2	1	2			2	2			2		2		1	1			24
7		1	1		1	1				1	1	1		1		2	2		1		2		1	2	2	1	21
8	1							2						1		2	1		1		1		1				10
9	1				1	2				1	1				1	1	2		1								11
10	1		1							1				1	1					2							7
11			1			1				2																	4
12										1				2					1								4
13													2	1													3
15															1												1
16					1										1				1								3
19														1													1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE III (Continued)

Physical Contact with Children (Material or Non-Material): Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	All Girls
0	14	15	21	14	12	11	7	13	20	13	15	27	24	8	16	25	14	10	22	18	24	23	6	14	386
1	4	6	6	10	7	6	7	5	3	10	9	3	3	12	6	4	7	15	7	4	4	3	7	4	152
2	3	3		3	2	3	7	5	4	3	2	1	2	6	5	2	4	2	1	5	2	4	5	3	82
3	2	3		4	3	2	4	1	3	2	3		2	1	1		3	2	1	1	1	2	3	1	52
4	3	1	3			3	3	3		2				1	1	1	1	1		2			1	3	31
5	3	1		1	3	1	1	2	2	1		1		3	3			2		1	1		2		26
6	2		1		1						3						1						2		11
7						1		1					1				1		1	1			2		8
8							1										1						1	1	4
9						1	2																		3
10			1							1				1											3
11					1			1																1	3
17	1																								1
19					1																				1
21						1																			1
22								1																	1
41						1																			1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE III (Continued)

Physical Contact with Children (Material or Non-Material): First Grade Group--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys	Girls													All Girls
	M101	M140	M142	M147	M119	M103	M104	M105	M106	M120	M107	M121	M149	M108		F92	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F113	F98	F129	
0	1		5	2	9	3	2		6	12	4	11	7	3	65	8	5	10	11	6	4	15	5	3	11	8	11	12	3	9	121
1	1	3	4	3	4	4	4	1	5	2	3	5	4	2	45	4	4	1	1	2	3	3	6	2	5	5	4	5	2	6	55
2	3	2	4	2	2	3	5	1	2	4	3	3	4	3	41	5	5	6	2	5	3	4	3	5	3	2	4	3	2	2	59
3	1	2	1	1	3	3	1	4	3		2	2	2	2	27	2	2	4	2	3	3		2	3	1	3	1	1	3	3	33
4	2	5	1	1	1	3	5	3	3		2	2	1	4	33	1	1	1	3		1			2	1	2	2	2	3	1	20
5		3	2	2		1	1	1		1	2		2	2	17		4		1	4	2	1		7	1		1	1	2	1	25
6	1	1	1	3	2			2					1	1	12		1			1		1	1		1						5
7	2	2		2	1	3			1				1		12			1		1			1			2	1		1		7
8	1					2	4	2	4	1				1	15	2			1	2			2		1	1			2		11
9	2		2	2				3			2				11	1		1			2								2	1	7
10	4							1			2		1	2	10											1					1
11	2					1	1	1		2	2			1	10	1														1	2
12		1	1	2	1			1			1	1		1	9				1				1	1				1		4
13		1		1				1						1	4								1								1
14	1		1			1		1			1			1	6				1				1								2
15	1							1							2		1		1									1			3
16													1		1		1						1								2
17		1								1					2						1							1			2
18			1												1													1			1
19	1														1									1							1
21	1														1																
23				1			1	1							3																
24			1												1																
26		1													1																
27				1											1																
28										1					1																
32				1											1																
35					1										1																
43		1													1																
45		1													1																
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

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TABLE III (Continued)

Physical Contact with Children (not involving materials): Kindergarten Group--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys																									All Boys
	M30	M32	M35	M34	M36	M38	M34	M39	M36	M60	M61	M47	M48	M33	M64	M35	M65	M29	M36	M28	M29	M40	M41	M93	M86	M43	
0	13	27	19	23	20	17	31	14	29	12	19	15	20	19	12	21	20	31	20	23	14	26	24	14	21	23	527
1	9	1	6	6	4	7		7	2	6	8	11	9	4	8	5	6	1	8	5	10	4	4	9	5	5	150
2	4	2	1	1	5	2	1	5		3	2	5	1	4	5	2	1		3	3	2	1		6	3	2	64
3	2	1	4	2	1			3		6	3	1		1	5	2	1				4		3	1	2	1	45
4	2		1		1	4				3			1	1	1	1						1		1	1		18
5			1					1	1					2			1				1		1				8
6		1				1		1						1			1		1							1	7
7	2							1									2							1			6
8					1								1								1						3
9										2						1											3
10																				1							1
11						1																					1
12															1												1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

Number of Five-Second Intervals	Girls																									All Girls
	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F82		
0	22	24	25	26	16	14	17	21	24	18	20	30	28	16	22	26	22	23	26	22	27	26	16	19		532
1	4	4	5	5	11	7	10	3	2	7	8	2	1	11	6	4	6	7	6	4	3	2	5	7		130
2	3	3	2		2	4	2	3	5	4	2		2	3	3	2	1	1		4	1	1	3	3		54
3		1		1	2	2	1	1		3			1		1		1				1	1	4	1		21
4	1					2	2	2	1					1			1	1		2				1		14
5	1					1		1			2			1									3			9
6																	1						1			2
7																								1		1
10								1																		1
11	1																									1
19					1																					1
20						1																				1
40						1																				1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		768

TABLE III (Continued)

Physical Contact with Children (not involving materials): First Grade Group --Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys
	M101	M140	M142	M147	M119	M103	M104	M105	M106	M120	M107	M121	M149	M108	
0	7	7	17	10	20	14	8	8	11	20	10	18	19	9	178
1	4	4	6	8	2	3	9	4	6	1	3	4	2	4	60
2	1	10	1	1	1	3	4	5	1	3	6	1		3	40
3	1	2			1	3	3	2	1		2	1		3	19
4	2	1		1		1		1	2				1	2	11
5	2			1					1		1		1		6
6								2	2		2			1	7
7	2			1				1							4
8	1													1	2
9	1							1					1		3
11	1														1
12				2											2
13	1														1
14														1	1
18	1														1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336

Number of Five-Second Intervals	Girls														All Girls
	F92	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F113	F98	F129	
0	17	14	20	14	17	18	19	17	12	20	18	18	22	8	16	250
1	3	2	2	6	3	5	3	4	5	2	3	4	2	6	4	54
2		4		1	2		2			1	1	2		2	1	16
3	2	2	1	1	1			1	3	1						12
4	2		1						2					2	1	8
5		1			1			1	1		1			1	1	7
6				1							1			2		4
7						1										1
9		1													1	2
10								1	1					2		4
11														1		1
12				1												1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

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TABLE III (Continued)

Physical Contact with Children (involving materials): Kindergarten Group--Distribution of 72 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys																								All Boys
	M60	M62	M55	M64	M56	M58	M54	M59	M66	M60	M61	M47	M48	M63	M64	M35	M65	M69	M36	M38	M39	M40	M41	M93	M66	M43	
0	16	25	15	18	15	19	27	11	23	11	16	7	19	15	13	14	20	18	20	25	20	23	19	12	21	20	462
1	8	6	5	8	7	4	2	8	6	5	5	6	5	4	7	7	4	10	2	2	7	4	9	5	4	10	150
2	4	1	6	4	2	1	2	4	3	5	3	6	4	6	2	4	3	2	2	4		3	1	3	4	1	85
3	2		2	1	2	5	1	6		6	4	5	1		5		1	1	1		1	2	1	3	1		51
4	1		2	1	2			3		2	3	4	1	1	1	3	3		1		2			2			32
5			1		3	1						3	1		1			1	1		1		1	2	1	1	18
6						1					1	1			1	2									1		7
7										1				1	1	1			2		1						7
8						1								2		1	1		1				1				7
9	1									1			1														3
10																				1							1
11			1											1					1								3
12										1				1													2
13														1													1
14															1												1
15					1														1								2
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

Number of Five-Second Intervals	Girls																								All Girls
	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F45	F83	F62	
0	17	21	23	18	20	17	11	18	24	23	21	28	27	18	21	31	17	17	27	23	29	25	16	20	512
1	4	2	4	6	1	9	8	6	4	5	8	3	3	8	3		8	10	3	5	1	4	7	8	122
2	4	3	2	3	5	4	5	4	2	1	1		1	3	6		4	2		3	1	3	1	1	59
3	3	6	1	2	3		4		2	1	1			1	1		1	1	1				4	2	34
4	1				2	1	2	1		1				1		1	1	1					2		14
5	1		1	1			1				1	1			1		1	1			1				10
6	2							1												1			1		5
7										1			1						1				1		4
8						1	1																		2
9			1		1			1						1											4
11																							1		1
12								1																	1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE III (Continued)

Physical Contact with Children (involving materials): First Grade Group—Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys
	M101	M140	M142	M147	M119	M103	M104	M105	M106	M120	M107	M121	M149	M108	
0	3	2	5	6	10	4	7	1	14	13	6	13	7	4	95
1	3	4	6	1	5	7	2	2	1	3	5	6	7	7	59
2	2	3	3	4	2	3	5	3	4	2	2	1	3	3	40
3	3	2		1	1	2	3	4	2		2	3	2	3	28
4	3	4	2	1	1	2	1	1	1		1		1	1	19
5	1	2	2	1	1	1		4		1	1		2	1	17
6	2	1		3	2	1				1			1	1	14
7	2			1		1	3	1	1		3				12
8	1	1	1			1	1	4	1		2			1	13
9	3		1	1			1	2						2	10
10										1	1			1	3
11		1				1				1	1				4
12			2		1	1						1	1		6
13	1														1
14								1							1
17		1								1					2
18			1												1
20								1							1
22				1											1
23							1								1
24			1												1
26		1													1
27				1											1
28										1					1
32				1											1
35					1										1
43		2													2
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336

Number of Five-Second Intervals	Girls														All Girls
	F92	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F113	F98	F129	
0	10	8	11	12	8	4	16	7	5	13	10	15	13	4	12	148
1	4	6	2	3	1	7	4	4	5	4	6	2	4	3	5	60
2	5	5	6	3	5	5	2	3	6	2	2	2	3	4	4	57
3		1	3	2	4	2	1	3	3	1	2	2	2	4	2	32
4	3	2		2	1	1	1		2	1	2	1	2	3		21
5					3	2		1	1	2		1		1		11
6		1	1					1						1	1	5
7					2			1		1		1		1		6
8	1							1			1			1		4
9			1			2								2		5
10											1					1
11	1					1			2							4
12								1								1
13				1				2								3
14				1												1
16		1														1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

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TABLE IV

Number of Children Addressed: Nursery School Group--Distribution of 24 Five-Minute Observation Periods per Child by Number of Different Children Addressed per Period

Number of Children Addressed	Younger Boys																			All Younger Boys	Older Boys									All Older Boys
	M1	M2	M14	M13	M15	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20		M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	21	12	14	14	16	16	7	3	5	8	16	19	8	2	16	5	13	11	14	220	5	8	9	11	6	3	3	1	2	48
1	2	9	10	10	7	7	9	11	8	7	7	5	11	9	8	7	10	9	8	154	9	7	9	12	12	4	8	7	9	77
2	1	1			1	1	5	8	9	6	1		5	7		11	1	3	2	62	8	5	6	1	1	7	7	9	4	48
3		2					3	2	2	1				4		1				15	2	4			4	6	4	4	8	32
4										1				2				1		4					1	3	1	3	1	9
5																										1	1			2
6										1										1										-
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	456	24	24	24	24	24	24	24	24	24	216

Number of Children Addressed	Younger Girls																			All Younger Girls	Older Girls										All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19				F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	
0	14	16	5	18	22	21	12	18	6	17	14	6	19	7	17	13	14			239	3	12	6	4	1	12	2		13		5	58
1	7	6	7	4	2	3	6	4	7	7	8	9	3	11	5	10	8			107	13	10	9	8	5	8	7	4	6	10	4	84
2	2	2	7	2			6	2	11		2	6	2	4	2	1	2			51	4	2	5	8	4	2	7	9	4	11	8	64
3	1		4									1		1						7	2		3	2	8	2	6	10		3	6	42
4			1									2		1						4	2		1	2	5		2	1	1		1	15
5																									1						1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24			408	24	24	24	24	24	24	24	24	24	24	24	264

TABLE IV (Continued)

Number of Children Addressed: Kindergarten Group--Distribution of 32 Five-Minute Observation Periods per Child by Number of Different Children Addressed per Period

Number of Children Addressed	Boys																										All Boys
	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	
0		19	3	5	4	5	5	3	5				3	6	3	1	5	1	1	3		1	3	1	5	3	85
1	7	10	6	5	16	9	9	4	15	2	5		12	6	6	7	2	6	10	11	4	9	7	2	14	14	198
2	6	2	9	13	11	5	13	10	6	9	9	2	7	7	8	5	9	13	10	10	9	7	12	7	5	11	215
3	9	1	9	3		6	1	5	6	5	7	7	2	5	7	9	7	4	6	7	10	5	9	13	2	2	147
4	7		4	5	1	4	4	4		6	5	12	5	3	2	5	4	6	5		6	7	1	6	3	2	107
5						3		2		2	4	4	1	4	5	4	2	2		1	1	1		1	2		39
6	2		1	1				2		4		6	2	1	1		3					1		2	1		27
7								2		3	1					1					1	1					9
8										1		1									1						3
9	1										1																2
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

Number of Children Addressed	Girls																								All Girls
	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	
0	4	5	3	9	4	2	4	4	10	6	7	23	3	2	2	5		2	2	8	5	3	2	5	120
1	14	15	13	5	10	12	14	15	9	9	13	5	14	5	15	6	7	8	11	10	10	11	12	16	259
2	7	4	7	11	10	11	9	9	7	12	6	3	7	6	8	8	9	13	12	9	9	6	8	5	196
3	5	6	9	4	6	7	5	2	5	4	3		7	13	4	7	7	6	5	3	6	10	7	3	134
4	1	2		3	2			2	1	1		1	1	3	2	3	6	2	1	2	1	2	2	3	41
5	1										2			3		3	3		1						13
6											1							1			1		1		4
7															1										1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

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TABLE IV (Continued)

Number of Children Addressed: First Grade Group--Distribution of 24 Five-Minute Observation Periods per Child by Number of Different Children Addressed per Period

Number of Children Addressed	Boys														All Boys
	M101	M140	M142	M147	M119	M103	M104	M105	M106	M120	M107	M121	M149	M108	
0									1		1	2	3		7
1	2	2	8	2	6	7	3		3	4	2	8	2	3	52
2	2	5	3	8	9	4	6	5	5	13	6	11	8	3	88
3	4	11	7	7	6	8	6	3	5	6	6	2	2	6	79
4	6	4	3	2	3	4	6	3	4		5	1	7	4	52
5	4	2	2	4			2	7	3		3		2	4	33
6	1		1	1		1	1	5	1					4	15
7	2								1	1					4
8	2								1		1				4
9	1							1							2
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336

Number of Children Addressed	Girls														All Girls
	F92	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F113	F98	F129	
0	1	2	2	5	1	2	5	1		4	1	3		1	1	29
1	2	2	4	8	8	1	3	6	5	5	4	7	5		9	69
2	5	3	5	4	10	7	3	3	4	7	9	9	6	3	6	84
3	7	7	6	3	2	6	4	6	4	3	6	2	5	4	3	68
4	4	6	2	3	3	6	4	4	6	2	1	2	4	5	2	54
5	3	3	3			2	4	3	1	2	3	1	4	7	2	38
6	1	1	1				1	1	4					1		10
7	1		1	1						1				3		7
8															1	1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

TABLE V

Speech to Adults: Nursery School Boys--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																			All Younger Boys	Older Group									All Older Boys
	M1	M2	M14	M13	M15	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20		M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	14	9	14	17	23	15	12	10	9	8	15	19	6	10	15	8	18	6	7	223	5	3	12	13	7	6	8	4	7	65
1	3	4	5	3		4	2	3	4	4	5	2	3	4	1	1	2	3	3	56	4	4	2	3	4	2	2	6	7	34
2	4	2	4	2	1	1	2	5	3	5		2	3	4	5	2	2	4	4	55	2	3	3	2	4	2	2	2	1	21
3	2	6				2	1	2	2		1			1	2	2	2	2	3	28	2	3	2	2	2	2	3	5	3	24
4	1	1		1		1	1	1	2	1			2	2		4		3	1	21	2	2	2	2	2	1	2	2	2	17
5		2					1	1		2			4	1		1		2		14	3	2	2	1	1	2	4	1		16
6							2	1		1				1		2		1	2	10	1	1		1		1	2	1	1	8
7			1				2			1				1				2	1	8	2	1			1				2	6
8							1		1			1			1	1				5		2	1		2	2	1	1		9
9						1			1		2		2			1		1	1	9		1				1				2
10																1				1						1		1		2
11									1										1	2						1				1
12				1		1														2										
13									1											1						1				1
14																					1					1		1		3
15											1								1	2	1				1					2
16						1							2							3		1				1				2
17													1							1	1									1
18								1												1										
19										1										1										
25													1							1		1							1	2
26																1				1										
42										1										1										
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	456	24	24	24	24	24	24	24	24	24	216

TABLE V (Continued)

Speech to Adults: Nursery School Girls--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																	All Younger Girls	Older Group										All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19		F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	
0	14	14	15	15	16	9	9	18	13	21	6	12	11	19	13	10	11	226	12	8	9	7	7	14	6	8	12	6	1	90
1	3	4	6	4	3	6	2	4	3	1	3	2	4		2	4	5	56	5	5	3	4	2	3	5	3	3	5	2	40
2	2	4	1	4	2	2	5		3	1	5	2	3	4	2	4	4	48	1	2	1	3	3	3	3	4	2	1	4	27
3	3						3	1	1	1	2	1	2	1	2	2		19	4		6	1	4	1	1	1	1	6	2	27
4			1		1	1	1		1		2	1			1	1	2	12		2	1	2	1	2	3	3	2	2	5	23
5			1			4	1		1		2	3	1		2	1		16	2		3	3	4		2	1	1		1	17
6	2	2			2			1			2		2		1		2	14		2	1	1	2		1	1		1	1	10
7							1				1	2						4		2		1		1	2		1	1		8
8									1		1							2				1			1		1		3	6
9																1		1												
10																							1			1		1	1	4
11				1			1											2											2	2
12							1								1			2								1				1
13						1												1		1		1								2
15																1		1		2								1		3
16						1			1			1						3												
18																													1	1
19													1					1									1			1
26																										1				1
28																													1	1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	408	24	24	24	24	24	24	24	24	24	24	24	264

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TABLE V (Continued)

Speech to Adults: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	All Boys
0	31	28	25	30	25	21	17	19	30	18	15	18	22	23	16	14	16	15	29	15	25	20	12	26	23	30	563
1			2	1	5	5	1	5	1	7	3	2	6	2	5	3	5	1	1	3	5	1	2	2	2	2	72
2		1	2	1	2	2	4	5			3	3	1	3	5	4	2	5	1	2	2	4	2	1			55
3	1	1	1				1	2	1	1		3	1		2	7	3	4		3		1			4		36
4		1				3		1		1	2	2	2	1		3	2	5		2		2	2	3	1		33
5			1			1				3	1	2			1	1			1	1		2	1		1		16
6							1			1	2						1	1		5			3				14
7		1					1				1	1		1	1		2						3				11
8							1				1			1			1						1				5
9										1					1			1				1	2				6
10							1				2												1		1		5
11							2					1		1						1		1	2				8
12							1				1																2
13							1																				1
14															1												1
16							1				1												1				3
17			1																								1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		832

TABLE V (Continued)

Speech to Adults: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	All Girls
0	19	11	12	23	20	27	24	20	17	9	12	27	30	25	24	25	19	17	27	10	22	20	20	14	474
1		3	3	5	3	3	2	4	1	2	5	1		3	2	2	2	4	1	1	3	2	2	1	55
2	1	2	4		3	1	1	2	2			3	1	3	2	2	3	3	2	2	2	4	3	3	51
3	4	4	3		3	1	1	1	3	1	4	1	1	1	1	2	1	2		1	2	1	1	3	42
4	4	3	2		1		2		3	3	3					1	2	3	1				1	2	31
5	1			2	1		1	2	1	5	1							1		2	1	1	1	5	25
6	2		2	2					2	5	2						1	2	1	2		3	1		25
7			1		1			2	1	2	1				3					3	2			1	17
8		2					1	1		2	1						1			2				1	11
9		2	2							1	1						1			2		1			10
10	1	2	2														1			2					8
11										1										2				1	4
12		1																					1	1	3
13										1															1
14		1							1																2
15																				1					1
16			1						1		1														3
17											1						1								2
19		1																		1					2
22																				1					1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE V (Continued)

Speech to Adults: First Grade Group--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Boys														All Boys
	M101	M140	M142	M147	M119	M103	M104	M105	M106	M120	M107	M121	M149	M108	
0	20	14	10	16	19	19	19	16	21	18	23	15	10	21	241
1	2	6	2	1	2	2	2	4	1	2		1	3		28
2	2	1	2	4	1	2	2	1	2	1	1	2	4	2	27
3			2	1	2			1		2		2	3	1	14
4			2	1			1	1					1		6
5		1		1		1		1		1					5
6												1	2		3
7												1			1
8			1												1
9			1												1
10		1	1									2	1		5
11		1	1												2
13			1												1
14			1												1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	336

Number of Five-Second Intervals	Girls														All Girls
	F92	F122	F93	F94	F89	F110	F124	F95	F96	F111	F97	F112	F113	F98	F129	
0	13	18	18	17	23	20	15	22	24	16	23	20	13	15	13	270
1	4	3	2	3		4	1			4	1	2	6	5	1	36
2		1	1	1			3	1		3		1	2	3		16
3	4	1	2	2	1		2	1		1			3	1	2	20
4			1	1			1								2	5
5		1										1			1	3
6							1									1
7	2														3	5
8							1									1
10															1	1
13	1															1
15															1	1
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	360

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TABLE VI

Nonsocial Language: Nursery School Boys--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																		All Younger Boys	Older Group									All Older Boys
	M1	M2	M14	M13	M15	M16	M3	M4	M5	M6	M17	M7	M19	M8	M9	M10	M11	M12	M20		M13	M14	M15	M16	M17	M18	M19	M20	M21	
0	2	2	4	3	15	6	2	2	1		5	9			3	3	6	9	6	83	11	2	5	4	4	5	1	4	5	41
1	1	1	7	4	3	7	1	1		2	4	6	2	1	3		5	2	3	56	4	3	1	1	6	1	3	3	4	26
2		2	2	2	4	1	1			4	4	1	2		3	1	2	5	5	39		2	2	1	4	3	1	4	2	19
3	3	2	2	3	1	1	2	3			2	2	4		2	2	1	2		38	2	3	3	2		1	1	3	1	18
4	2			3		1	1	4	1	2	2	2	2	1	5	1	2			29		3	1	1		2			3	10
5	2	1	3					1		2	1	1	1			1	2	1	2	18		2	1	1	1	3	3	6	1	18
6	1						2	2	2		1	1		5	1	1			3	1	20	3	1		1		3	3	1	1	13
7	1	1							2	3	2				1	2	3	1		1	17	1	2	1	1	1		2	1	1	10
8		1		2				1	1	2	2					1					10			1	2	1		1			5
9	1	1	1		1	1	1	3		1				1	2					13	1			1	2	2			1	7
10	2		2	1		1	4	1	1	1				1	2		2	1		19	1	1	1		2		2			7
11	1	2	2						1	1	1	2	2	1						13		1	2				1			4
12	1						1	1	1		1				1	2	3			11	1		1	2		1			1	6
13		1						1		1		1			1			2	2	9							2	1	1	4
14	1								1		1			1	2		1	1		8			2	1						3
15		1								1				1					1	4										
16	2	2						1		1		1			1		1			9						1	2		1		4
17		1	1					2				1			1	1				7				1						1	2
18	1	2						1		1				1	3			1		10				1		1				2
19	1								1	3			1				1			7										
20	1	1					1	2							1	1	1			8				2					1	3
21		1												1	2					4										
22									2						1		1			4								1		1
23								1			1									2				2						2
24		1							1								1			3		1			1					2
25		1													1		1			3		1							1	2
26				1				1												2					1					1
27											1	1								2							1			1
28	1																			1				1	1		1			3
29									1								1			2							1			1
30									1											1										
32									2											2										
34															1					1										
36							1													1										
38										1										1										
42									1											1										
43										1										1				1						1
44							1													1										
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	456	24	24	24	24	24	24	24	24	24	216

TABLE VI (Continued)

Nonsocial Language: Nursery School Girls--Distribution of 24 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	Younger Group																All Younger Girls	Older Group										All Older Girls
	F1	F2	F3	F10	F4	F5	F6	F12	F7	F13	F14	F8	F16	F17	F18	F9	F19		F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	
0		3	1	1	19	9	2	4	6	10	15		5	6	10	1	4	96	3	14	5	6	6	9	5	6	6	8	7	75
1		3	2	2	1	3		1	5	4	2	1	2	3	4	1	5	39		4	1	3	3	1	6	5	3	1	1	28
2	1	1	1	1		1	3	3	2	4	2		3	2	1	2	4	31	2	2	2	4	2		3	2		3	6	26
3	1	3		4	1	4	1	1	2	1	2		3		2	1	1	27	4		2	1			2	1	1	1	3	15
4		3	2	2		2	3	2	4	1	2	2	3	1	4	1	1	33			1	1	3	4	2	1	4		1	17
5	1	1		3	1	1		3	1			1	2	2	1	2	2	21	3	1	2	3	4			1	3	2	2	21
6	1	1	2	1				1	1		1						2	10	2		3	1	1	2		4		1		14
7	1	4			1		2	3				2	3	2		1	1	20	3	1	1		1	2	1	1	2	1	1	14
8	1		1	1		1	4		1	1		2	1	2	1	1	1	18	1	1	2	1	2			2	1	1		11
9	2	2	1	1		1	2	1										10	1					1				1		3
10	1	1	1	4			1			1		2		1				12	1		1	1		1	1	1			2	8
11	2	1	3	3			2		1			2		1			2	17	1					1	1				1	4
12	1		3													1		5			1	1					1		3
13	1		1	1		2	1	1	1			1		1		1		11				1			1					2
14			1				3	1		1		2						8			1				1					2
15			1											1		1		3					2	1			1			4
16	3													1				4	1					1						2
17	1		1									2				1		5												
18			2		1							1				1		5			1									1
19			1											1				2							1			1		2
20												2	1					3		1							1			2
21																2		2	1											1
22	1	1						1				1	1			1		6			1									1
23												1						1										2		2
24	1																	1												
25								1				1						2									1			1
26	2							1				1						4									1			1
29	1																	1						1						1
30	1															1		2												
31															1			1												
32																											1			1
33																	1	1												
34																						1								1
36																			1											1
38	1																	1												
40											1					1		2												
42																1		1												
44																1		1												
45																1		1												
48																1		1												
Number of Observation Periods	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	408	24	24	24	24	24	24	24	24	24	24	24	264

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TABLE VI (Continued)

Nonsocial Language: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	All Boys
0	3	28	19	8	30	24	4	7	13	11	15	8	14	15	13	10	8	26	12	29	21	17	18	22	18	13	406
1	5	2	7	9	1	3	1	9	7	8	2	5	4	4	11	4	5	2	10	1	4	7	7	5	3	9	135
2	2		1	4		3	6	1	4	5	4	4	1	1	2	5	4	3	6	1	3	4	5	3	3	2	77
3	3	1		1			2	3	3	1	2	2	7	3	2	4	7	1	1		2	3		1		1	50
4	3		2	2	1		1	5		2		3	3	1		3	1		2		2				1	2	34
5	3			1			2		1	2	4	1		3		1	3						1		2	1	25
6	1	1		3			2	2				1	1			1			1				1				14
7	2		1	1			3					1	1		1											1	11
8				1				1	1			2				1	2									1	9
9	2							1				2	1		1	1								1			9
10	1		1				1			1	3			1		1											9
11	2							1		1		1															5
12				1					1	1																1	4
13							2		1																1		4
14			1	1				1																			3
15	1						1										1			1							4
16												1				1											2
17												1															1
18	2						1																				3
19														1													1
20	2						1							1											1		5
21											1																1
22											1			1	1												3
23																						1					1
25															1												1
26						1																			1		2
28						1																			1		2
30									1																		1
31							1																				1
32							1																				1
33							1																			1	2
34								1																			1
38							1																				1
42																1											1
43														1													1
49																									1		1
54							1																				1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE VI (Continued)

Nonsocial Language: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F55	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	All Girls
0	22	24	17	19	15	22	18	12	25	26	6	31	18	14	20	18	8	10	22	17	17	25	21	11	436
1	5	5	3	4	4	4	5	7	7	3	5	1	5	8	6	6	7	9	3	6	9	4	5	9	130
2	3	3	1	2	4	4	4	1		1	6		4	3	1	4	4	2	3	4	1	1	3	4	63
3	1			2		2	1	4					1	1	2	3	3	4	1		1	1	1	4	32
4			2	3	1		2	1	2		1		2	3	1		1	1	1	1	1	1	1	2	27
5	1		3				1	2			3					1	2		1	1	1		1		17
6			1		2			2		1	2						2			1					11
7			2		1						2		1	2	1		2	1	1		1				14
8					1			1									1	2							5
9			1																	2					3
10							1											1							2
11								1										1							2
12			1														1								2
13																	1							1	2
14					2									1	1									1	5
15										1			1												2
17					1													1							2
18					1			1																	2
21											1														1
23				1																	1				2
30				1																					1
31											2														2
32			1																						1
35											1														1
36											1														1
48											1														1
57											1														1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

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TABLE VII

Work Activity: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M85	M84	M86	M88	M54	M89	M86	M60	M61	M47	M48	M83	M84	M85	M85	M89	M26	M38	M39	M40	M41	M93	M66	M43	All Boys
0																					1						1
2													1														1
3	1							1																			2
5																					1						1
7	1																										1
8																						1					1
9												1									1						2
10					1																						1
13																1											1
14							1																				1
15																1			1					1		2	5
16									1			1												1			3
17				1					1	1								1		1							5
18																						2					2
19		1										1				1					1	1				1	6
20						1	1					1								1							4
21				2				1											1			1			1		6
22	1		1																		1						3
23										1						1											2
24																		1			1						2
25			1													1					1	1					4
26					2						1	1	1			1			1	1							8
27										1			1							1		1					4
28												1	1									2				1	5
29		1	1					1													1						4
30					1											1						2				3	7
31											2				1						1		3				7
32															2			1		1	2					1	7
33								1			1	1				1	2	1		1	3	1					12
34	1	1					2	1		1		3					1	1	1	1			1				14
35	1					2					1	3			1							1	1	1			11
36							1				1	1		1				2				1					7
37	1										2				1				1	2			1	1			9
38	3								1						1			1			3	1				1	11
39		1					1	2	1	1		1						1		1	1		2	2		1	15
40	2					1		1		1	1						1	1	1	1						1	11
41	2	1															1	1	1			1	1		1	1	10
42	1		2										2	1	2	1		2		3			1	1		1	17
43	4		1	1		1	1	1			4	2	2	1	1	2		1		1	2			1	1	1	28
44	1		1			4				2	1				1	1		1	1			1	1			1	16
45			1		2	1	1			1	3				1	3						1	2		1		17
46				1	1		1	1		1	1	2	1			1	1		2	1			2	1	3	2	22
47	1		3	2		1					1					2	3		2	1	2	2	1	2	1	1	25
48		2	2	2	1		1		1		1	1		1	3	2	1		2		2		2			1	25
49		2		1	1	1	2	4	1			1	2	1	2	1	1					1					21
50		1	1			2	1	1	1	2		3	2		1	2			1	1	1	1	2	1	1	4	31
51	2		4	1		4		1			1		2	2	3		1	1	1		1	4	3		1	1	33
52	2		1	2	1	3		2	1	2	3	2	2	6			2	2		2	1	1		1	1		37
53	1	1	4	1	3	1	2	2	3	2	3		1	1		1	3	2		3	1		2	2	1	1	43
54	3	1	2	3	1	1	2	3	4	2	2	1	1	1	3	1	2	2	7	1		1	1	1	3	1	54
55		2		4	6	2	2	1	3	3	2	2	1	2	2	1	3	2	2	1	1	1		2	2	2	53
56	1	1	1	3	2	2	2	2	1			1	2	4	1		2	3	1	2	1	1	2	3	3	1	42
57	1	3	2	3	2	2	3	3	3	2	1		3	1	1		1	2	3	1				1	4	1	43
58		3	1	3	3	1	4		3	3			2	3	2	1	1	1	3	1		2	4	6	2	2	61
59		3	2	2	3		3	1	3	3			4	3	2	1	2	2	1	4	1			2	4		50
60		4	1		2		1			1			1		1	2		2						1		2	18
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE VII (Continued)

Work Activity: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F63	F62	All Girls
0																		1							1
1																							1		1
3			1																						1
4													1												1
5																				1					1
8						1		1																	2
9																								1	1
10																							1		1
13	1												1			1			1				1		5
14												1							1			1			3
17							1							1											2
18						1							1												2
19													3									1			4
20						1	1						1					1	1			1			6
21									1										1		1			1	4
22						1	1					1	1												4
23							1						1						1		1				4
24			1			1				1															3
25					1								3				2	1							7
26			1								1	2	1					1							6
27							3						1	1			2	1							8
28					2												1	2		1		1			7
29	1			1									1					1			1				5
30		1		2			1		1	1		1	1			1	2	1	1						13
31	1										2		3		1			1	1			1			10
32					1						1	1	1			2						1	1		8
33								1		1		2			1	1					2	1			9
34		2					1							2	1		1	1	1	1	1	1			12
35				1		1		1														2	1		6
36			1						1	2	2		3		1	1	1		1			1	1		15
37		1						1			1				2	1	3	1			2	1		1	14
38		1	1	1						2		1	1	1	1	1	1				1	1			13
39					1							2			1	1		4	1	1			2		13
40		1					1					1	2		1	2				1	1				10
41		1			2	1		2				1	2		1		1	1	3		2	2			19
42		1		1		1	2	1	1	1	1	1				1	3		1			1			16
43		1	2			2	1					2			1			3	1	1	4	1		2	21
44	1		3	1	1				1	1	2	1			2		1		2		3	1			20
45		2	1	1			1	1		1				2	1	1		3	1	1			1	2	19
46		1	3	1	1	1		1	1		1		2	3	2		2		2	1	2	1		1	26
47		2			2	1	1			3	1			1		1			1	2	1		1	1	18
48		2		2		1	1	2	2		2			1		1	2	1		1		2		1	21
49	2			1	2	2	1		2		1	1		2		3		1	1		3	2		3	27
50	1	1	3	1	1	1	3	2	3	2	2	1	1	2		1	4	2	2	3	1	3	1	1	42
51	2		3	3		2	2	2	2					1	4							1	1	3	36
52	4	4	3	1	1	1	4		4	1	1	4		2	1	2	1	2	2	2	1	2	2	1	46
53	1	2	1		1	2	1	1	1	1	2	4		1	1	4			1	2		1	1	3	31
54	4	3	2	3	3	2		1	1	2	3	1		2		2	1		1			1			32
55	2	1	2	3	1	1	1		1	4	2	1		1	3	3	1	1	1	1		1	3	2	36
56	3	2	1	1	4	1		6	2	2	2	1		1	2	2	1		1	1	2		4	2	41
57	4	1	2	3	1	3	2	4	2	2	4		1	3	3		1	2	1	4			5	4	52
58	3			4	2	3	1	1	2	3				2	2					4	1		2	2	32
59		1	1	1	2	1	1	3	3	2	1	1		3					1	3	1		3	1	29
60	2	1			3			1	1			1						1			1	1			12
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

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TABLE VIII

Use of Work Materials: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	All Boys
0																					2						2
1									1				1														2
2	1		1					1	1			1									1				1	1	8
3	1				1			1																			3
4							1		1												1						3
5	1																							1		1	3
6																1		1		1	1	1					5
7				1				1								1					1					1	5
8				1																		1					2
9	1					1						1							1		1			1		1	7
10	1																2										3
11																1				1		2					4
12			1				2			1	3	3															10
13	1						1	1		1				1							2						7
14						1	1			1	2	1			1			1		1		1	1				11
15			1							1	1																4
16		1						1							1		2			1	1	2				1	10
17			2	1		2							1					1				2		1			10
18	1	1	1						1					1		2		1				1				1	10
19		2				1						1	2		1				1		1	1	1	1		1	13
20	2										3	1	1		1						1	1		2		3	15
21	2					1		1	1	1	2	2			1	1	1	3		2	1	2		1	2	1	25
22			3		1	2	1	2	1	1	2	1		1				1		1					1	3	21
23	3			1		2						2			3		2		1			1				1	16
24		1	1			2	2	3		1		3			2						1			1	1		18
25	2		2											2			2	1	1	2							12
26	1		2	1		1	1				1	1		1	1			1		2			2	1	1	2	19
27	1	1	2			2	2	1		3	2	2	1		1	1				1	1	2	2	1		1	27
28			1		1		2				2	2		2	1	1		1	1			1		1		1	17
29	1		3	1	1	1	3		2			1			3		1				1		1		1	2	22
30		2			2	1	1	2	1			1		2		1	4				2		3	2	1	1	26
31		2				1		1	1	1				1	2	2	1	2			1		2	2	2	2	23
32	2		1	2			1	2	1	3	1	1	2				1	1	2	2	1	2	1	3			29
33	2		2			1		2	1	2	2			1	2		2	2	2		2		1	1	2		27
34		1	1		2	1	1	2	1	2	1		2	1	4	1	1	1	1	3			1	1	2	1	31
35				1	1			2	1	2		1	1		2			2	1	3	1	1		3	3	2	27
36	1	1	1	1		3		1	1		4	1						1	1	2	1		2	1	2	1	25
37	1	1			1	1				1		1	1	2	2	2	2		2				1			1	19
38	1		2		4	1	1	1	1	2	2	1	1	2		3	1			1	1			1	1		27
39		1	2	3	1		2	2	1			1	1	1	2	2			3			1	2		1		26
40			1	3	3	1	1	1	4	2		1	3	1		2		1			1	1	2		2		30
41				1	1	1	2		1	2	1			2		2			1	2	1		1	2	2		22
42		2			1	2	3		2	1	1		1	1		2	1		1		1		1		1	1	22
43	2	2		3	2			1	1		2		1	1			1	1	1			1	1		1	1	22
44	1	1			1		1						1	1		1		1		3		1			2	1	15
45	1	1		2		2	1						2	1			3		1				2	1	1		16
46		1		1	2				3	1			1	1		2	1		1		2	1		1	1		19
47		2		2	1		1			1			1	2	1	1		1	1	1							15
48	2	1		1		,1			2	1		1	3	1			1		1		1			1			17
49		1	1	1				1		1		1				1	1	1	2			1					12
50				1	1		1		1					1	2			2		1		2	1	1	1		15
51			1	1	3			2									1					2					10
52		1			1									1		1					1			1			6
53		1		2	1				1					1						1				1	1		9
54		1															1		1	3				1			7
55		1		1										2	1			2				1					8
56																		2	1					1			4
57		3																	1			1					5
58																	1										1
59																				1							1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE VIII (Continued)

Use of Work Materials: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Five-Second Intervals per Period in which Behavior Occurred

Number of Five-Second Intervals	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F55	F77	F78	F37	F38	F40	F39	F60	F42	F43	F53	F62	All Girls
0																		1							1
1														1						1			1		3
2			1			1																			2
3													1												1
4					1											1								1	3
5										1													2		3
6								1										1							2
7	1					1																1	1		4
8							2																1		3
9		1																		1		1			3
10		1									1														2
11										1	1		1		1				1	1				1	7
12							2												1						3
13							1				1	1			1								1		5
14			1				2	1					2					1							7
15	1												1			1						1	1		5
16		2				1					1		1		2					1	1	1	1	1	12
17		1				1	1		1				1			1									6
18						3	1					1	2				1		2		1				11
19					1					1	1		1			1			1						6
20			1		2		2	1	1		1	1	3	1											13
21		2	1	1		1						1		1	1		2	1			1				12
22		1	1	1			1	2				3	1	1	1	1	2			2					17
23			1	1			1			1			2	1			3				1	1	2	1	15
24	1		1	2				1	2	1	2	1	1		2	1	1	2		1					19
25	2		1	1	1				2	3	1		1	1		1	2		2	1		2			21
26		1	2		4	1	1					1						1	2		1	1		2	17
27		2	1		1				1	1		1	3	1		1				1		2	1	1	17
28	1	1			1	1	1	1	1	1		1	1	1	3		1	3		1	2	1	3	1	26
29		1						3		2		1	1	1	1			1		3		3			17
30			2							2	1	1			1	1	1	1		2			2	1	15
31		1			1		3	1		1	2	2	2	2	1	1	2			2	3	2	1	1	22
32		2		1	1	2		3	2	1	1	1	2		3		1	1	2	1		2	1	1	23
33	1	2	1		1	1		2	1	1	1		1		1	1	1	1	1	2	3		1	2	25
34	1	2	2	3	2				3	1				1		2	1	1	2		1	1		3	26
35	1		2			2			2	1	4	2		2			2	1	1		2	3	1	1	27
36	2	2	1	2	1	1	3	1		1	1	1		3		3	1	1		1	2			3	30
37	2	1	2	2	2	1	1	1	1	1		1		1	1		1	1				2		2	23
38			1		2	2		1	1		4	3	1	1	1		1	4	1		1			1	25
39	1	1	2	3	1	1	2	1		2	1	2	1	2	1			3	2	1	1	1	1		29
40	2			2	1	1	1	2	2		1	2		2		2	1	1	2		1		1		24
41	2	1					1	2	4						2				1	1	1	1	1	1	18
42		1	3	2			1	2	1	1			1	4	2				2		1		1	1	23
43	2	2			1	2		1	1	2	1	1		1			1		2	1	1	1	1		21
44	3		2	1	1	1	1	1	1	1	1					1			1		1	1	2	1	22
45		1	1		2	1	1		1	1	1			1					3	1	3		1	3	21
46	1	1		2	1	2		1	1	1					2	2		1		3		1			19
47		1		2			1	2						2		3		1			1	2		1	16
48				2	2	1				1		1		1		1	2				1		2	1	15
49		1	1	1			2	1	1		1	1			1	1	1	1	1	1	1	1			17
50	2			2		2			1			1	1		1	2	3				1				16
51	1		1	1	2				1	1	2				1		1		1	1				1	14
52						1						1				1		1			1				5
53	1														2	2			1		2				8
54	2																		1						3
55											1					1							1		3
56																			1				1		2
57							1					1													2
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

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TABLE IX

Number of Distractions from Work: Kindergarten Boys--Distribution of 32 Five-Minute Observation Periods per Child by Number of Instances of Continuous Nonwork Activity per Period

Number of Distractions	M80	M82	M55	M84	M56	M58	M54	M59	M86	M60	M61	M47	M48	M63	M64	M35	M65	M89	M36	M38	M39	M40	M41	M93	M66	M43	All Boys
0		4	1		2		1			1			1		1	2		2					1		2		18
1	1	5	1	1	2		4	1	3	2			2	5		1	2		1	3	1	2	1	5	5	1	49
2		3	4	1	3	2	5	2	1	4	2	1	3	4	4			4	2	3	1	2	3	5	1	2	62
3		5	4	4	3	4	5	6	3	1	2	2	5	4	1	4	2	1	6	6	3		3	1	3	4	82
4		3	5	3	1	3	3	6	5	4	4	2	4	3		2	6	3	3	3	2	1	1	4	4	3	78
5	2	2	3	5	3	2	2	3	5	2		5	4	5	3	6	5	2	3	3	2	1	4	7	6	2	89
6	2	1	1	2	4	4	2	2	3	5	6	4	4	1	3	2	4	6	4	2	2	2	2		2	6	80
7	3	2	2	5	3	3	2		1	1	3	7	4	1	3	5	3	2	3	2		2	3		4	4	68
8	2	2	3	4	3	5	2	2	4	3	2	3	1		5	1	3	4	2	4	2	7	5	4	2	2	77
9	6	3	5	1	2	4	1	2	2	2	2	3	1	1	5	3	1		2	1		5	5	2			61
10	4			1	2	1	3	1	3	2		2		2	4	2	3	3	1		6	2	2	1	1	1	47
11	2		2			1		1		2	3	2		1			2		2	1	2	2	2		1	2	28
12	2		1	1		1		1	1	1	3	1	1	2		2		1	2	2	1	3		1			27
13		1		3	2	2	2			1			1	3							1	1	1			1	19
14				1	1						1		1		2	1	1				1	3		2	1		15
15	4										1				1	1		1				3				1	12
16		1						1		1	1							1				1	1			1	8
17	1				1			1	1													2					6
18	1							1																			2
19																						1					1
20											1								1								2
25											1																1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	832

TABLE IX (Continued)

Number of Distractions from Work: Kindergarten Girls--Distribution of 32 Five-Minute Observation Periods per Child by Number of Instances of Continuous Nonwork Activity per Period

Number of Distractions	F51	F50	F52	F71	F54	F47	F56	F57	F58	F48	F59	F75	F35	F77	F78	F37	F38	F40	F39	F60	F42	F43	F83	F62	All Girls
0	2	1			3			1	1			1					1			1	1				12
1	1	2	1	1	1	1		3	2	4		1		2				1	2	3			2	1	28
2	1	2		3	4		1	2	2	4	3	1		4	1	1			1	2	2		6	1	41
3	4	1	3	3	3	1	1	3	2	4	4	2	1	3	4		1	3	1	3		1	4	1	53
4	6	5	7	7	5	6	3	6	4	2	3	2		3	3	2		3	4	6	2	3	4	6	92
5	5	4	4	4	6	4	3	5	2	4	4	5	6	2		4	2	3	4	3	4	5	1	7	91
6	1	4	1	3	2	4	6	1	3		4	4	1	5	5	4	6	1	2	2		2	4	3	70
7	1	6	5	1	4	3	1		3	5	4	4	2	2	3	3	1	1	3			4	2	5	65
8	3	2	3	3	1	1	6	3	4	2	3	3	1	4	4	5	6	5	3	3	4	4	2		75
9	3	1	4	1	1	4	2	4	4	4	1	2	1		1	3	2	3	3	4	4	5	2	4	63
10	1	2		1	1	1	2		1	1	1	2	3	1	2	4	3	1	1		7	1		1	37
11	2	1	1	3		2	1	2	2			1	2	1	2	2	2	6	3	1		3			37
12			2		1	1	2		2	1	1	1	4		2	1	3	3	2	2	3		1	1	33
13	1	1		1		1	2	1			2	2	4	2	3	1	2	1	1		2	1	1	2	31
14			1	1		1					1		1	2	1		1	1	1	1	1	1	1		15
15						1						1	1	1	1		1		1		1				8
16	1									1						1						1			4
17						1					1		1			1						1			5
18													3							1	1				5
19																							1		1
20								1									1								2
22													1												1
25																							1		1
Number of Observation Periods	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	768

TABLE X

Number and Percent Distribution of Social Contact with Children by Verbal and Physical Contact.

Nursery School Boys

Child	Number of Five-Second Intervals			% of Total Intervals	
	Verbal	Physical	Total	Verbal	Physical
M 8	178	25	203	88	12
M 6	81.5	104.5	186	44	56
M 4	97	45	142	68	32
M 10	106	33	139	76	24
M 2	46.5	78.5	125	37	63
M 20	45	80	125	36	64
M 19	81	44	125	65	35
M 5	80	25	105	76	24
M 12	59.5	33.5	93	64	36
M 3	75.5	11.5	87	87	13
M 11	41	41	82	50	50
M 17	51	27	78	65	35
M 7	20.5	53.5	74	28	72
M 13	35	29	64	55	45
M 16	52.5	8.5	61	86	14
M 14	31.5	20.5	52	61	39
M 9	32.5	14.5	47	69	31
M 15	16	25	41	39	61
M 1	4	7	11	36	64
All Younger Boys	1134	706	1840	62	38
M 18	303	57	360	84	16
M 21	224.5	86.5	311	72	28
M 20	281.5	23.5	305	92	8
M 19	180.5	33.5	214	84	16
M 17	120	49	169	71	29
M 14	126	12	138	91	9
M 13	107.5	25.5	133	81	19
M 15	89.5	3.5	93	96	4
M 16	58	22	80	73	27
All Older Boys	1490.5	312.5	1803	83	17

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TABLE X (Cont.)

Number and Percent Distribution of Social Contact with Children by Verbal and Physical Contact.

Nursery School Girls

Child	Number of Five-Second Intervals			% of Total Intervals	
	Verbal	Physical	Total	Verbal	Physical
F 3	154.5	65.5	220	70	30
F 8	153.5	15.5	169	91	9
F 17	91	35	126	72	28
F 13	21.5	87.5	109	20	80
F 19	48	59	107	45	55
F 16	52	36	88	59	41
F 7	60.5	18.5	79	77	23
F 6	26.5	42.5	69	38	62
F 14	46.5	22.5	69	67	33
F 10	42	25	67	63	37
F 12	46.5	16.5	63	74	26
F 18	21	40	61	34	66
F 9	49	11	60	82	18
F 2	22.5	19.5	42	54	46
F 1	28.5	10.5	39	73	27
F 5	11	10	21	52	48
F 4	3	11	14	21	79
All Younger Girls	877.5	525.5	1403	63	37
F 17	355	46	401	89	11
F 14	277	35	312	89	11
F 16	239.5	39.5	279	86	14
F 10	245	31	276	89	11
F 19	212	31	243	87	13
F 20	166	41	207	80	20
F 12	152.5	17.5	170	90	10
F 13	109	43	152	72	28
F 15	90.5	19.5	110	82	18
F 18	83	18	101	82	18
F 11	33	6	39	85	15
All Older Girls	1962.5	327.5	2290	86	14

TABLE X (Cont.)

Number and Percent Distribution of Social Contact with Children by Verbal and Physical Contact.

Kindergarten Boys

Child	Number of Five-Second Intervals			% of Total Intervals	
	Verbal	Physical	Total	Verbal	Physical
M 47	654.5	69.5	724	90	10
M 60	616.5	98.5	715	86	14
M 84	670.5	27.5	698	96	4
M 39	548	52	600	91	9
M 61	502.5	47.5	550	91	9
M 80	485.5	59.5	545	89	11
M 65	480.5	44.5	525	92	8
M 93	457	61	518	88	12
M 35	454.5	62.5	517	88	12
M 40	476.5	21.5	498	96	4
M 59	402	73	475	85	15
M 86	444	10	454	98	2
M 63	350.5	86.5	437	80	20
M 89	386	19	405	95	5
M 36	327.5	76.5	404	81	19
M 64	322	81	403	80	20
M 54	394.5	6.5	401	98	2
M 55	335	60	395	85	15
M 43	355.5	27.5	383	93	7
M 41	315.5	37.5	353	89	11
M 48	311	37	348	89	11
M 58	271	68	339	80	20
M 66	271	38	309	88	12
M 38	223.5	35.5	259	86	14
M 56	173	70	243	71	29
M 82	67.5	19.5	87	78	22
All Boys	10295.5	1289.5	11585	89	11

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TABLE X (Cont.)

Number and Percent Distribution of Social Contact with Children by Verbal and Physical Contact.

Kindergarten Girls

Child	Number of Five-Second Intervals			% of Total Intervals	
	Verbal	Physical	Total	Verbal	Physical
F 83	630	58	688	92	8
F 77	587	40	627	94	6
F 47	513.5	93.5	607	85	15
F 38	556	35	591	94	6
F 57	409.5	52.5	462	89	11
F 54	392.5	59.5	452	87	13
F 37	434	11	445	98	2
F 56	346.5	62.5	409	85	15
F 52	336	26	362	93	7
F 40	327	32	359	91	9
F 51	288.5	56.5	345	84	16
F 35	300	16	316	95	5
F 43	279	14	293	95	5
F 78	257	29	286	90	10
F 50	247.5	31.5	279	89	11
F 39	238	15	253	94	6
F 42	239.5	12.5	252	95	5
F 59	204.5	30.5	236	87	13
F 71	200.5	23.5	224	90	10
F 60	181.5	29.5	211	86	14
F 48	176	35	211	83	17
F 62	147	43	190	77	23
F 58	141.5	22.5	164	86	14
F 75	67.5	8.5	76	89	11
All Girls	7500	837	8337	90	10

TABLE X (Cont.)

Number and Percent Distribution of Social Contact with Children by Verbal and Physical Contact.

First Grade Group

Child	Number of Five-Second Intervals			% of Total Intervals	
	Verbal	Physical	Total	Verbal	Physical
M 105	813	108	921	88	12
M 101	723	121	844	86	14
M 104	624.5	62.5	687	91	9
M 147	552.5	122.5	675	82	18
M 140	481.5	142.5	624	77	23
M 108	485	92	577	84	16
M 106	529	41	570	93	7
M 107	468	87	555	84	16
M 103	438	65	503	87	13
M 120	327	62	389	84	16
M 142	278	102	380	73	27
M 119	316	63	379	83	17
M 149	240	54	294	82	18
M 121	255.5	26.5	282	91	9
All Boys	6531	1149	7680	85	15
F 98	630	95	725	87	13
F 95	548	68	616	89	11
F 96	540.5	64.5	605	89	11
F 113	483	17	500	97	3
F 92	400.5	40.5	441	91	9
F 129	364.5	33.5	398	92	8
F 122	324	61	385	84	16
F 124	332.5	14.5	347	96	4
F 110	266	59	325	82	18
F 94	267	53	320	83	17
F 89	252	53	305	83	17
F 93	253	32	285	89	11
F 112	224.5	27.5	252	89	11
F 97	192	48	240	80	20
F 111	210	28	238	88	12
All Girls	5287.5	694.5	5982	88	12

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TABLE XI

Number and Percent Distribution of All Language by Speech to Children, Speech to Adults and Nonsocial Speech.

Nursery School Boys

Child	Number of Five-Second Intervals				% of Total Intervals		
	Speech to Children	Speech to Adults	Non-social Speech	Total Speech	Speech to Children	Speech to Adults	Non-social Speech
M 1	4	21	224	249	1.6	8.4	90.0
M 2	50	40	265	355	14.1	11.3	74.6
M 14	34	20	100	154	22.1	13.0	64.9
M 13	36	23	81	140	25.7	16.4	57.9
M 15	20	2	23	45	44.5	4.4	51.1
M 16	53	53	159	265	20.0	20.0	60.0
M 3	79	52	238	369	21.4	14.1	64.5
M 4	104	52	173	329	31.6	15.8	52.6
M 5	83	65	414	562	14.8	11.5	73.7
M 6	88.5	101.5	251	441	20.1	23.0	56.9
M 17	52	41	121	214	24.3	19.2	56.5
M 7	21	14	68	103	20.4	13.6	66.0
M 19	88	127	170	385	22.9	33.0	44.1
M 8	184	41	350	575	32.0	7.1	60.9
M 9	34	26	124	184	18.5	14.1	67.4
M 10	107	97	263	467	22.9	20.8	56.3
M 11	42	12	105	159	26.4	7.6	66.0
M 12	62	68	67	197	31.5	34.5	34.0
M 20	47	78	56	181	26.0	43.1	30.9
All Younger Boys	1188.5	933.5	3252	5374	22.1	17.4	60.5
M 13	112	103	66	281	39.9	36.6	23.5
M 14	129	113.5	133.5	376	34.3	30.2	35.5
M 15	90	40	183	313	28.7	12.8	58.5
M 16	58	32	240	330	17.6	9.7	72.7
M 17	124	69	137	330	37.6	20.9	41.5
M 18	301.5	119.5	130	551	54.7	21.7	23.6
M 19	165.5	63	225.5	454	36.4	13.9	49.7
M 20	287.5	75.5	91	454	63.3	16.6	20.1
M 21	229.5	68	134.5	432	53.1	15.8	31.1
All Older Boys	1497	683.5	1340.5	3521	42.5	19.4	38.1

TABLE XI (Cont.)

Number and Percent Distribution of All Language by Speech to Children, Speech to Adults and Nonsocial Speech.

Nursery School Girls

Child	Number of Five-Second Intervals				% of Total Intervals		
	Speech to Children	Speech to Adults	Non-social Speech	Total Speech	Speech to Children	Speech to Adults	Non-social Speech
F 1	29	28	366	423	6.9	6.6	86.5
F 2	23	24	126	173	13.3	13.9	72.8
F 3	164	16.5	233.5	414	39.6	4.0	56.4
F 10	42	23	148	213	19.7	10.8	69.5
F 4	3	23	36	62	4.8	37.1	58.1
F 5	10	65	73	146	6.9	43.1	50.0
F 6	29	60	172	261	11.1	23.0	35.9
F 12	47	13	169	229	20.5	5.7	73.8
F 7	63	45	74	182	34.6	24.7	40.7
F 13	22	6	91	119	18.5	5.0	76.5
F 14	48	63	26	137	35.0	46.0	19.0
F 8	155	58	315	528	29.3	11.0	59.7
F 16	55	52	110	217	25.3	24.0	50.7
F 17	94	11	135	240	39.2	4.6	56.2
F 18	23	44	72	139	16.5	31.7	51.8
F 9	49	51	425	525	9.3	9.7	81.0
F 19	43	33	112	194	25.3	17.0	57.7
All Younger Girls	905	613.5	2683.5	4202	21.5	14.6	63.9
F 10	248	29	174	451	55.0	6.4	38.6
F 11	34	86	48	168	20.2	51.2	28.6
F 12	155	47.5	141.5	344	45.1	13.8	41.1
F 13	113	70	116	299	37.8	23.4	38.8
F 14	280	66	97	443	63.2	14.9	21.9
F 15	94	26.5	132.5	253	37.1	10.5	52.4
F 16	243	65.5	99.5	406	59.9	15.6	24.5
F 17	359	85	77	521	68.9	16.3	14.8
F 18	82	56	161	299	27.4	18.7	53.9
F 19	218.5	71	141.5	431	50.7	16.5	32.8
F 20	171.5	149	73.5	394	43.5	37.8	18.7
All Older Girls	1998	749.5	1261.5	4009	49.8	18.7	31.5

TABLE XI (Cont.)

Number and Percent Distribution of All Language by Speech to Children, Speech to Adults and Nonsocial Speech.

Kindergarten Boys

Child	Number of Five-Second Intervals				% of Total Intervals		
	Speech to Children	Speech to Adults	Non-social Speech	Total Speech	Speech to Children	Speech to Adults	Non-social Speech
M 80	497.5	3	199.5	700	71.1	0.4	28.5
M 82	70	16	11	97	72.2	16.5	11.3
M 55	349	31	48	428	81.6	7.2	11.2
M 84	670.5	3	84.5	758	88.5	0.4	11.1
M 56	183	9	5	197	92.9	4.6	2.5
M 58	286	26	63	375	76.3	6.9	16.8
M 54	397	105	341	843	47.1	12.5	40.4
M 59	416.5	25	126.5	568	73.3	4.4	22.3
M 86	446.5	4	90.5	541	82.5	0.8	16.7
M 60	641	44	71	756	84.8	5.8	9.4
M 61	512	96	106	714	71.7	13.4	14.9
M 47	674	53	123	850	79.3	6.2	14.5
M 48	327	19	60	406	80.5	4.7	14.8
M 63	374.5	37.5	147	559	67.0	6.7	26.3
M 64	338	55.5	83.5	477	70.9	11.6	17.5
M 35	466	48.5	88.5	603	77.3	8.0	14.7
M 65	500	53.5	125.5	679	73.6	7.9	18.5
M 89	389	58	10	457	85.1	12.7	2.2
M 36	335.5	8	38.5	382	87.8	2.1	10.1
M 38	227	70	18	315	72.1	22.2	5.7
M 39	562.5	9	23.5	595	94.5	1.5	4.0
M 40	480	50	47	577	83.2	8.7	8.1
M 41	319.5	131.5	27	478	66.8	27.5	5.7
M 93	475	16	23	514	92.4	3.1	4.5
M 66	275	36.5	158.5	470	58.5	7.8	33.7
M 43	362.5	2	88.5	453	80.0	0.4	19.6
All Boys	10574.5	1010	2207.5	13792	76.7	7.3	16.0

TABLE XI (Cont.)

Number and Percent Distribution of All Language by Speech to Children, Speech to Adults and Nonsocial Speech.

Kindergarten Girls

Child	Number of Five-Second Intervals				% of Total Intervals		
	Speech to Children	Speech to Adults	Non-social Speech	Total Speech	Speech to Children	Speech to Adults	Non-social Speech
F 51	300	57	19	376	79.8	15.2	5.0
F 50	254	130	11	395	64.3	32.9	2.8
F 52	342	100	100	542	63.1	18.5	18.4
F 71	209.5	27	78.5	315	66.5	8.6	24.9
F 54	407.5	34	105.5	547	74.5	6.2	19.3
F 47	531.5	8	17.5	557	95.4	1.5	3.1
F 56	358.5	28	38.5	425	84.3	6.6	9.1
F 57	427	42.5	82.5	552	77.4	7.7	14.9
F 58	148	80	15	243	60.9	32.9	6.2
F 48	185	135	26	346	53.5	39.0	7.5
F 59	212.5	102.5	319	634	33.5	16.2	50.3
F 75	69	10	1	80	86.3	12.5	1.2
F 35	300.5	5	44.5	350	85.9	1.4	12.7
F 77	597.5	12	53.5	663	90.1	1.8	8.1
F 78	266	30	39	335	79.4	9.0	11.6
F 37	434.5	16	27.5	478	90.9	3.3	5.8
F 38	568	69.5	96.5	734	77.4	9.5	13.1
F 40	333	44.5	89.5	467	71.3	9.5	19.2
F 39	241	15	28	284	84.9	5.3	9.8
F 60	189	183	47	419	45.1	43.7	11.2
F 42	243	32	53	328	74.1	9.7	16.2
F 43	280.5	44.5	12	337	83.2	13.2	3.6
F 83	655.5	42	22.5	720	91.1	5.8	3.1
F 62	157	87	64	308	51.0	28.2	20.8
All Girls	7710	1334.5	1390.5	10435	73.9	12.8	13.3

APPENDIX C

TABLE I A

Social Contact with Children (Verbal or Physical): Nursery School Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 8	205	8.46	6.69	79	F 3	220	9.17	7.26	79
M 6	186	7.75	7.11	92	F 8	169	7.04	6.39	91
M 4	142	5.92	3.40	57	F 17	126	5.25	5.67	108
M 10	139	5.79	5.39	93	F 13	109	4.54	6.78	149
M 2	125	5.21	5.58	107	F 19	107	4.46	5.06	113
M 20	125	5.21	5.50	106	F 16	88	3.67	5.73	156
M 19	125	5.21	4.93	95	F 7	79	3.29	2.75	84
M 5	105	4.37	4.01	92	F 6	69	2.87	2.89	101
M 12	93	3.87	5.85	151	F 14	69	2.87	3.10	108
M 3	87	3.62	3.83	106	F 10	67	2.79	3.22	115
M 11	82	3.42	3.37	99	F 12	63	2.62	2.66	102
M 17	78	3.25	3.19	98	F 18	61	2.54	3.48	137
M 7	74	3.08	3.92	127	F 9	60	2.50	2.81	112
M 13	64	2.67	3.09	116	F 2	42	1.75	2.42	138
M 16	61	2.54	3.64	143	F 1	39	1.62	2.08	128
M 14	52	2.17	1.84	85	F 5	21	.87	.93	107
M 9	47	1.96	3.84	196	F 4	14	.58	.91	157
M 15	41	1.71	1.86	109					
M 1	11	.46	.91	198					
All Younger Boys	1840	4.03	4.84	120	All Younger Girls	1403	3.44	4.73	137
M 18	360	15.00	9.07	60	F 17	401	16.71	10.35	62
M 21	311	12.96	8.34	64	F 14	312	13.00	6.44	50
M 20	305	12.71	9.83	77	F 16	279	11.62	9.17	79
M 19	214	8.92	5.61	63	F 10	276	11.50	7.49	65
M 17	169	7.04	6.99	99	F 19	243	10.12	7.74	76
M 14	138	5.75	5.99	104	F 20	207	8.62	7.53	87
M 13	133	5.54	4.41	80	F 12	170	7.08	5.12	72
M 15	93	3.87	4.85	125	F 13	152	6.33	5.17	82
M 16	80	3.33	4.33	130	F 15	110	4.58	5.77	126
					F 18	101	4.21	5.54	132
					F 11	39	1.62	2.58	159
All Older Boys	1803	8.35	7.97	95	All Older Girls	2290	8.67	8.12	94

TABLE I A (Cont.)

Social Contact with Children (Verbal or Physical): Kindergarten Group --Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 47	724	22.62	8.68	38	F 83	688	21.50	13.25	62
M 60	715	22.34	9.37	42	F 77	627	19.59	10.88	56
M 84	698	21.81	14.01	64	F 47	607	18.97	12.28	65
M 39	600	18.75	11.08	59	F 38	591	18.47	9.83	53
M 61	550	17.19	9.84	57	F 57	462	14.44	11.43	79
M 80	545	17.03	9.26	54	F 54	452	14.12	12.19	86
M 65	525	16.41	13.75	84	F 37	445	13.91	10.42	75
M 93	518	16.19	7.73	48	F 56	409	12.78	10.57	83
M 35	517	16.16	8.50	53	F 52	362	11.31	11.12	98
M 40	498	15.56	8.87	57	F 40	359	11.22	8.35	74
M 59	475	14.84	8.04	54	F 51	345	10.78	10.15	94
M 86	454	14.19	13.45	95	F 35	316	9.87	8.60	87
M 63	437	13.66	12.13	89	F 43	293	9.16	6.49	71
M 89	405	12.66	8.78	69	F 78	286	8.94	7.61	85
M 36	404	12.62	9.11	72	F 50	279	8.72	8.80	101
M 64	403	12.59	8.75	69	F 39	253	7.91	7.02	89
M 54	401	12.53	9.67	77	F 42	252	7.87	5.44	69
M 55	395	12.34	8.20	66	F 59	235	7.34	7.86	107
M 43	383	11.97	9.41	79	F 71	224	7.00	8.02	115
M 41	353	11.03	9.69	88	F 60	211	6.59	6.48	98
M 48	348	10.87	9.38	86	F 48	211	6.59	5.71	87
M 58	339	10.59	9.93	94	F 62	190	5.94	5.34	90
M 66	309	9.66	8.45	87	F 58	164	5.12	4.98	97
M 38	259	8.09	7.01	87	F 75	76	2.37	5.96	251
M 56	243	7.59	7.21	95					
M 82	87	2.72	4.74	174					
All Boys	11585	13.92	10.66	77	All Girls	8337	10.86	10.26	94

TABLE I A (Cont.)

Social Contact with Children (Verbal or Physical): First Grade Group —Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 105	921	38.37	10.71	28	F 98	725	30.21	10.48	35
M 101	844	35.17	11.11	32	F 95	616	25.67	14.30	56
M 104	687	28.62	11.01	38	F 96	605	25.21	13.17	52
M 147	675	28.12	11.15	40	F 113	500	20.83	10.93	52
M 140	624	26.00	11.81	45	F 92	441	18.37	9.68	53
M 108	577	24.04	9.80	41	F 129	398	16.58	10.52	63
M 106	570	23.75	13.58	57	F 122	385	16.04	11.92	74
M 107	555	23.12	10.73	46	F 124	347	14.46	10.69	74
M 103	503	20.96	10.15	48	F 110	325	13.54	7.34	54
M 120	389	16.21	8.72	54	F 94	320	13.33	13.99	105
M 142	380	15.83	9.42	60	F 89	305	12.71	9.18	72
M 119	379	15.79	8.83	56	F 93	285	11.87	9.26	78
M 149	294	12.25	9.91	81	F 112	252	10.50	9.46	90
M 121	282	11.75	9.06	77	F 97	240	10.00	6.40	64
					F 111	238	9.92	7.70	78
All Boys	7680	22.86	13.07	57	All Girls	5982	16.62	12.20	73

TABLE II A

Speech to Children: Nursery School Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Five-Second Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 8	184	7.67	6.37	83	F 3	164	6.83	6.54	96
M 10	107	4.46	5.03	113	F 8	155	6.46	6.53	101
M 4	104	4.33	3.04	70	F 17	94	3.92	5.58	142
M 6	89	3.71	4.42	119	F 7	63	2.62	2.53	96
M 19	88	3.67	3.08	84	F 16	55	2.29	2.96	129
M 5	83	3.46	3.33	96	F 9	49	2.04	2.49	122
M 3	79	3.29	3.67	112	F 14	49	2.04	2.57	126
M 12	62	2.58	4.14	160	F 19	49	2.04	3.67	180
M 16	53	2.21	3.34	151	F 12	47	1.96	2.37	121
M 17	52	2.17	2.66	123	F 10	42	1.75	2.93	167
M 2	50	2.08	3.26	157	F 1	29	1.21	2.08	172
M 20	47	1.96	2.52	129	F 6	29	1.21	1.47	121
M 11	42	1.75	2.35	134	F 18	23	.96	2.09	218
M 13	36	1.50	1.85	123	F 2	23	.96	1.48	154
M 9	35	1.46	3.64	249	F 13	22	.92	1.38	150
M 14	34	1.42	1.50	106	F 5	10	.42	.76	181
M 7	21	.87	1.64	186	F 4	3	.12	.44	338
M 15	20	.83	1.10	133					
M 1	4	.17	.47	276					
All Younger Boys	1190	2.61	3.72	143	All Younger Girls	906	2.22	3.80	171
M 18	304	12.67	8.31	66	F 17	360	15.00	9.52	63
M 20	288	12.00	9.63	80	F 14	281	11.71	6.01	51
M 21	231	9.63	7.29	76	F 10	249	10.38	6.56	63
M 19	166	6.92	4.68	68	F 16	243	10.12	8.48	84
M 14	129	5.38	5.85	109	F 19	219	9.12	7.64	84
M 17	125	5.21	6.41	123	F 20	172	7.17	7.20	100
M 13	112	4.67	3.64	78	F 12	155	6.46	5.08	79
M 15	91	3.79	4.71	124	F 13	113	4.71	3.59	76
M 16	58	2.42	3.88	160	F 15	94	3.92	5.07	129
					F 18	83	3.46	5.57	161
					F 11	34	1.42	2.31	163
All Older Boys	1504	6.96	7.27	104	All Older Girls	2003	7.59	7.52	99

TABLE II A (Cont.)

Speech to Children: Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 84	679	21.22	13.85	65	F 83	656	20.50	12.81	62
M 47	676	21.12	8.48	40	F 77	601	18.78	10.55	56
M 60	642	20.06	8.63	43	F 38	570	17.81	9.79	55
M 39	563	17.59	10.80	61	F 47	532	16.62	10.42	63
M 61	516	16.12	9.35	58	F 37	435	13.59	10.42	77
M 80	504	15.75	8.54	54	F 57	429	13.41	10.76	80
M 65	501	15.66	13.06	83	F 54	408	12.75	12.04	94
M 40	480	15.00	8.96	60	F 56	359	11.22	9.77	87
M 93	475	14.84	7.18	48	F 52	343	10.72	10.91	102
M 35	470	14.67	7.30	50	F 40	334	10.44	8.03	77
M 86	449	14.03	13.38	95	F 35	302	9.44	8.54	90
M 59	418	13.06	7.49	57	F 51	300	9.37	8.77	93
M 54	399	12.47	9.60	77	F 43	281	8.78	6.33	72
M 89	390	12.19	8.88	73	F 78	266	8.31	7.45	90
M 63	375	11.72	10.89	93	F 50	254	7.94	8.40	106
M 43	363	11.34	9.36	83	F 42	243	7.59	5.34	70
M 55	349	10.91	7.46	68	F 39	241	7.53	7.03	93
M 64	339	10.59	7.92	75	F 59	214	6.69	7.22	108
M 36	336	10.50	7.94	76	F 71	210	6.56	7.66	117
M 48	328	10.25	8.84	86	F 60	189	5.91	6.21	105
M 41	321	10.03	9.00	90	F 48	185	5.78	5.60	97
M 58	286	8.94	9.02	101	F 62	157	4.91	4.76	97
M 66	280	8.75	8.15	93	F 58	148	4.62	4.52	98
M 38	227	7.09	6.44	91	F 75	69	2.16	5.39	250
M 56	183	5.72	5.37	94					
M 82	70	2.19	4.09	187					
All Boys	10619	12.76	10.14	79	All Girls	7726	10.06	9.78	97

TABLE II A (Cont.)

Speech to Children: First Grade Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 105	821	34.21	11.28	33	F 98	645	26.88	9.69	36
M 101	779	32.46	11.54	36	F 95	501	20.88	9.69	46
M 104	583	24.29	10.15	42	F 113	494	20.58	10.80	52
M 106	547	22.79	13.08	57	F 96	438	18.25	9.95	55
M 147	530	22.08	9.40	43	F 92	415	17.29	9.40	54
M 140	500	20.83	8.68	42	F 129	374	15.58	10.38	67
M 107	496	20.67	10.66	52	F 124	337	14.04	10.32	74
M 108	461	19.21	7.41	39	F 122	303	12.62	8.96	71
M 103	460	19.17	9.02	47	F 110	287	11.96	6.98	58
M 120	319	13.29	6.89	52	F 93	260	10.83	9.06	84
M 119	294	12.25	5.52	45	F 94	254	10.58	9.06	113
M 142	288	12.00	7.55	63	F 89	236	9.83	7.80	79
M 149	251	10.46	9.39	90	F 112	224	9.33	8.54	92
M 121	248	10.33	8.48	82	F 111	214	8.92	7.33	82
					F 97	190	7.92	5.16	65
All Boys	6577	19.57	11.91	61	All Girls	5172	14.37	10.61	74

TABLE III A

Physical Contact with Children (Material or Non-Material): Nursery School Group—Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 6	117	4.87	4.94	101	F 13	89	3.71	6.58	177
M 2	82	3.42	4.15	121	F 3	75	3.12	3.28	105
M 20	78	3.25	4.53	139	F 19	63	2.62	4.07	155
M 4	58	2.42	2.27	94	F 6	45	1.87	2.34	125
M 7	55	2.29	3.35	146	F 18	43	1.79	3.07	172
M 19	49	2.04	3.16	155	F 16	41	1.71	4.43	259
M 11	40	1.67	3.03	181	F 17	39	1.62	2.35	145
M 12	39	1.62	4.32	267	F 10	26	1.08	1.53	142
M 10	38	1.58	2.90	184	F 7	22	.92	1.11	121
M 8	34	1.42	2.17	153	F 14	21	.87	1.48	170
M 13	30	1.25	2.20	176	F 2	20	.83	1.55	187
M 17	30	1.25	1.48	118	F 8	18	.75	1.09	145
M 5	28	1.17	1.75	150	F 12	17	.71	1.27	179
M 15	28	1.17	1.75	150	F 9	12	.50	.96	192
M 14	24	1.00	1.44	144	F 1	11	.46	.64	139
M 9	17	.71	1.72	242	F 4	11	.46	.76	165
M 3	15	.62	1.11	179	F 5	9	.37	.63	170
M 16	9	.37	1.07	289					
M 1	7	.29	.73	252					
All Younger Boys	778	1.71	3.03	177	All Younger Girls	562	1.38	2.87	208
M 21	102	4.25	6.46	152	F 17	73	3.04	5.06	166
M 18	71	2.96	2.73	92	F 13	53	2.21	3.35	152
M 17	56	2.33	2.97	127	F 16	49	2.04	3.80	186
M 19	39	1.62	2.12	131	F 20	46	1.92	3.37	176
M 13	30	1.25	2.17	174	F 14	44	1.83	2.95	161
M 20	29	1.21	1.68	139	F 10	39	1.62	3.24	200
M 16	22	.92	2.56	278	F 19	37	1.54	2.20	143
M 14	15	.62	1.04	168	F 15	24	1.00	2.18	218
M 15	5	.21	.58	276	F 12	22	.92	1.49	162
					F 18	18	.75	1.66	221
					F 11	7	.29	.54	186
All Older Boys	369	1.71	3.18	186	All Older Girls	412	1.56	3.06	196

TABLE III A (Cont.)

Physical Contact with Children (Material or Non-Material): Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 60	128	4.00	3.46	86	F 47	121	3.78	7.78	206
M 63	114	3.56	4.84	136	F 83	86	2.69	2.35	87
M 64	111	3.47	4.03	116	F 57	80	2.50	4.28	171
M 47	94	2.94	1.82	62	F 54	77	2.41	3.82	159
M 59	90	2.81	2.37	84	F 56	76	2.37	2.44	103
M 36	86	2.69	3.98	148	F 51	72	2.25	3.34	148
M 56	84	2.62	3.47	132	F 77	56	1.75	2.08	119
M 58	84	2.62	3.06	117	F 62	54	1.69	2.41	143
M 35	82	2.56	2.89	113	F 38	49	1.53	2.09	137
M 80	80	2.50	2.62	105	F 48	45	1.41	2.04	145
M 93	80	2.50	2.09	84	F 59	40	1.25	1.79	143
M 55	75	2.34	2.87	123	F 50	39	1.22	1.43	117
M 65	69	2.16	2.90	134	F 40	39	1.22	1.36	111
M 39	69	2.16	2.38	110	F 78	38	1.19	1.59	134
M 61	62	1.94	2.29	118	F 60	37	1.16	1.73	149
M 48	57	1.78	3.10	174	F 52	34	1.06	2.20	208
M 66	47	1.47	1.89	129	F 71	33	1.03	1.24	120
M 41	45	1.41	2.19	155	F 58	30	.94	1.46	155
M 38	41	1.28	2.49	195	F 35	20	.62	1.44	232
M 84	37	1.16	1.46	126	F 39	19	.59	1.35	229
M 43	35	1.09	1.68	154	F 43	17	.53	.94	177
M 40	26	.81	1.24	153	F 42	16	.50	1.09	218
M 89	23	.72	1.07	149	F 37	12	.37	.85	230
M 82	22	.69	1.38	200	F 75	10	.31	.95	306
M 86	18	.56	1.09	195					
M 54	11	.34	.98	288					
All Boys	1670	2.01	2.81	140	All Girls	1100	1.43	2.74	192

TABLE III A (Cont.)

Physical Contact with Children (not involving materials): Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 60	60	1.87	2.30	123	F 47	94	2.94	7.54	256
M 64	49	1.53	2.22	145	F 83	44	1.37	1.80	131
M 80	45	1.41	1.85	131	F 54	40	1.25	3.30	264
M 58	44	1.37	2.35	172	F 57	35	1.09	2.11	194
M 59	44	1.37	1.80	131	F 51	30	.94	2.16	230
M 39	39	1.22	1.73	142	F 62	27	.84	1.48	176
M 65	36	1.12	2.08	186	F 77	26	.81	1.16	143
M 63	35	1.09	1.70	156	F 56	25	.78	1.11	142
M 93	35	1.09	1.47	135	F 48	24	.75	1.00	133
M 55	29	.91	1.37	151	F 59	22	.69	1.26	183
M 56	29	.91	1.64	180	F 38	21	.66	1.33	202
M 35	28	.87	1.80	207	F 60	20	.62	1.11	179
M 47	24	.75	.83	111	F 58	16	.50	.97	194
M 48	23	.72	1.55	215	F 78	15	.47	.79	168
M 38	21	.66	1.79	271	F 50	13	.41	.78	190
M 61	21	.66	.95	144	F 40	13	.41	.82	200
M 66	21	.66	1.07	162	F 52	9	.28	.57	204
M 36	20	.62	1.17	189	F 71	8	.25	.62	248
M 41	18	.56	1.20	214	F 35	8	.25	.71	284
M 43	18	.56	1.22	218	F 37	8	.25	.57	228
M 84	14	.44	.83	189	F 42	8	.25	.66	264
M 82	14	.44	1.22	277	F 43	7	.22	.65	295
M 40	10	.31	.44	142	F 39	6	.19	.39	205
M 86	7	.22	.89	405	F 75	2	.06	.24	400
M 54	2	.06	.35	583					
M 89	1	.03	.17	567					
All Boys	687	.83	1.57	189	All Girls	521	.68	2.08	306

TABLE III A (Cont.)

Physical Contact with Children (involving materials): Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 63	79	2.47	3.79	153	F 56	51	1.59	1.80	113
M 47	70	2.19	1.73	79	F 57	45	1.41	2.71	192
M 60	69	2.16	2.71	125	F 51	42	1.31	1.81	138
M 36	66	2.06	3.68	179	F 83	42	1.31	1.84	140
M 64	62	1.94	2.86	147	F 54	37	1.16	1.92	166
M 56	55	1.72	2.91	169	F 77	30	.94	1.75	186
M 35	54	1.69	2.27	134	F 47	29	.91	1.57	173
M 93	48	1.50	1.52	101	F 38	28	.88	1.24	141
M 55	47	1.47	2.21	150	F 62	27	.84	2.00	238
M 59	46	1.44	1.37	95	F 50	26	.81	1.21	149
M 61	41	1.28	1.62	127	F 40	26	.81	1.21	149
M 58	40	1.25	2.00	160	F 52	25	.78	1.83	235
M 80	35	1.09	1.77	162	F 71	25	.78	1.17	150
M 48	34	1.06	1.91	180	F 78	23	.72	1.18	164
M 65	33	1.03	1.79	174	F 48	21	.66	1.47	223
M 39	30	.94	1.71	182	F 59	18	.56	1.06	189
M 41	27	.84	1.66	198	F 60	17	.53	1.17	221
M 66	26	.81	1.47	181	F 58	14	.44	.87	198
M 84	23	.72	1.00	139	F 39	13	.41	1.32	322
M 89	22	.69	1.07	155	F 35	12	.37	1.27	343
M 38	20	.62	1.82	294	F 43	10	.31	.63	203
M 43	17	.53	.97	183	F 42	8	.25	.94	376
M 40	16	.50	.90	180	F 75	8	.25	.90	360
M 86	12	.37	.65	176	F 37	4	.12	.70	583
M 54	9	.28	.71	254					
M 82	8	.25	.50	200					
All Boys	989	1.19	2.07	174	All Girls	581	.76	1.52	200

TABLE III A (Cont.)

Physical Contact with Children (Material or Non-Material): First Grade Group—Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 140	224	9.33	11.87	127	F 98	140	5.83	5.17	89
M 101	195	8.12	5.39	66	F 95	102	4.25	4.92	116
M 147	193	8.04	8.27	103	F 96	95	3.96	4.00	101
M 105	185	7.71	5.06	66	F 122	81	3.37	4.09	121
M 108	124	5.17	4.25	82	F 94	77	3.21	4.48	140
M 142	121	5.04	6.20	123	F 110	77	3.21	3.72	116
M 107	119	4.96	4.42	89	F 89	70	2.92	2.56	88
M 104	108	4.50	4.82	107	F 92	60	2.50	3.15	126
M 103	98	4.08	3.58	88	F 97	58	2.42	2.84	117
M 120	90	3.75	6.72	179	F 129	48	2.00	2.80	140
M 119	87	3.62	7.16	198	F 93	45	1.87	2.26	121
M 149	71	2.96	3.73	126	F 111	37	1.54	2.14	139
M 106	69	2.87	2.85	99	F 112	35	1.46	1.87	128
M 121	37	1.54	2.53	164	F 113	27	1.12	1.49	133
					F 124	22	.92	1.57	171
All Boys	1721	5.12	6.39	125	All Girls	974	2.71	3.58	132

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TABLE III A (Cont.)

Physical Contact with Children (not involving materials): First Grade Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 101	100	4.17	4.74	114	F 98	66	2.75	3.43	125
M 108	55	2.29	3.20	140	F 96	37	1.54	2.35	153
M 105	52	2.17	2.47	114	F 122	30	1.25	2.09	167
M 147	50	2.08	3.45	166	F 94	29	1.21	2.61	216
M 107	38	1.58	1.85	117	F 129	24	1.00	2.10	210
M 106	36	1.50	1.98	132	F 95	22	.92	2.21	240
M 140	34	1.42	1.11	78	F 92	17	.71	1.31	185
M 104	26	1.08	1.00	93	F 97	16	.67	1.54	230
M 103	22	.92	1.25	136	F 89	15	.62	1.22	197
M 149	20	.83	2.12	255	F 110	12	.50	1.41	282
M 121	9	.37	.75	203	F 93	9	.37	.99	268
M 142	8	.33	.55	167	F 112	8	.33	.62	188
M 119	7	.29	.72	248	F 111	7	.29	.73	252
M 120	7	.29	.68	234	F 124	7	.29	.69	238
					F 113	2	.08	.26	325
All Boys	464	1.38	2.44	177	All Girls	301	.84	1.89	225

TABLE III A (Cont.)

Physical Contact with Children (involving materials): First Grade Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 140	196	8.17	11.95	146	F 95	83	3.46	4.14	120
M 147	148	6.17	8.42	136	F 98	79	3.29	2.73	83
M 105	135	5.62	4.43	79	F 110	66	2.75	2.98	108
M 142	113	4.71	6.13	130	F 96	61	2.54	2.89	114
M 101	107	4.46	3.41	76	F 89	56	2.33	2.20	94
M 104	86	3.58	4.91	137	F 94	50	2.08	3.69	177
M 120	84	3.50	6.68	191	F 122	49	2.04	3.29	161
M 107	82	3.42	3.46	101	F 92	45	1.87	2.69	144
M 119	80	3.33	7.18	216	F 97	42	1.75	2.54	145
M 103	76	3.17	3.33	105	F 93	38	1.58	2.14	135
M 108	73	3.04	3.08	101	F 111	32	1.33	1.97	148
M 149	51	2.12	2.70	127	F 112	28	1.17	1.88	161
M 106	34	1.42	2.19	154	F 129	25	1.04	1.43	137
M 121	29	1.21	2.47	204	F 113	24	1.00	1.32	132
					F 124	15	.62	1.08	174
All Boys	1294	3.85	5.97	155	All Girls	693	1.92	2.73	142

TABLE IV A

Number of Children Addressed: Nursery School Group--Number of Five-Minute Observation Periods in which Speech Was Addressed to Children, Mean Number of Different Children Addressed per Period, Standard Deviation and Coefficient of Variation.

Boys	Number of Periods	Mean	σ	V	Girls	Number of Periods	Mean	σ	V
M 6	16	2.00	1.32	66	F 3	19	1.95	.88	45
M 8	22	1.96	.96	49	F 8	18	1.78	.97	54
M 10	19	1.68	.58	35	F 7	18	1.61	.49	30
M 5	19	1.68	.66	39	F 17	17	1.53	.85	56
M 3	17	1.65	.75	45	F 6	12	1.50	.50	33
M 4	21	1.57	.66	42	F 1	10	1.40	.66	47
M 12	13	1.46	.85	58	F 16	5	1.40	.49	35
M 2	12	1.42	.75	53	F 10	6	1.33	.48	36
M 1	3	1.33	.48	36	F 12	6	1.33	.48	36
M 19	16	1.31	.47	36	F 18	7	1.29	.45	35
M 20	10	1.20	.40	33	F 2	8	1.25	.44	35
M 16	8	1.12	.35	31	F 14	10	1.20	.40	33
M 17	8	1.12	.35	31	F 19	10	1.20	.40	33
M 15	8	1.12	.35	31	F 9	11	1.09	.28	26
M 11	11	1.09	.28	26	F 13	7	1.00	0	0
M 13	10	1.00	0	0	F 5	3	1.00	0	0
M 14	10	1.00	0	0	F 4	2	1.00	0	0
M 9	8	1.00	0	0					
M 7	5	1.00	0	0					
All Younger Boys	236	1.46	.75	51	All Younger Girls	169	1.46	.68	47
M 18	21	2.52	1.10	44	F 14	23	2.70	1.15	43
M 20	23	2.13	.99	46	F 17	24	2.33	.81	35
M 19	21	2.05	1.09	53	F 20	19	2.21	.84	38
M 21	22	2.04	.99	49	F 16	22	2.14	.96	45
M 14	16	1.81	.81	45	F 13	20	1.90	.94	49
M 17	18	1.67	.99	59	F 12	18	1.78	.91	51
M 13	19	1.63	.67	41	F 19	24	1.71	.67	39
M 15	15	1.40	.49	35	F 10	21	1.67	.98	59
M 16	13	1.08	.24	22	F 18	11	1.64	.87	53
					F 15	12	1.50	.76	51
					F 11	12	1.17	.36	31
All Older Boys	168	1.87	.98	52	All Older Girls	206	1.95	.98	50

TABLE IV A (Cont.)

Number of Children Addressed: Kindergarten Group--Number of Five-Minute Observation Periods in which Speech Was Addressed to Children, Mean Number of Different Children Addressed per Period, Standard Deviation and Coefficient of Variation.

Boys	Number of Periods	Mean	σ	V	Girls	Number of Periods	Mean	σ	V
M 47	32	4.28	1.33	31	F 77	30	2.77	1.12	40
M 60	32	3.81	1.93	51	F 38	32	2.66	1.26	47
M 65	27	3.15	1.43	45	F 37	27	2.59	1.26	49
M 59	29	3.14	1.73	55	F 71	23	2.22	.92	41
M 61	32	3.12	1.79	57	F 40	30	2.20	1.11	50
M 93	31	3.10	1.17	38	F 43	29	2.10	1.00	48
M 39	32	3.00	1.54	51	F 83	30	2.10	1.19	57
M 80	32	2.97	1.67	56	F 42	27	2.07	1.16	56
M 35	31	2.93	1.51	52	F 54	28	2.00	.93	46
M 64	29	2.83	1.46	52	F 59	25	2.00	1.41	70
M 63	26	2.81	1.49	53	F 39	30	1.97	.97	49
M 40	31	2.71	1.57	58	F 78	30	1.93	1.32	68
M 58	27	2.52	1.37	54	F 58	22	1.91	.89	47
M 55	29	2.52	1.16	46	F 48	26	1.88	.81	43
M 89	31	2.52	1.18	47	F 60	24	1.87	.93	50
M 84	27	2.44	1.21	50	F 52	29	1.86	.87	47
M 48	29	2.38	1.56	66	F 51	28	1.86	1.05	56
M 36	31	2.19	1.07	49	F 47	30	1.83	.79	43
M 66	27	2.15	1.51	70	F 35	29	1.83	.91	50
M 41	29	2.14	.81	38	F 50	27	1.82	1.01	55
M 54	27	2.00	.98	49	F 62	27	1.74	1.04	60
M 38	29	1.97	.86	44	F 56	28	1.68	.76	45
M 43	29	1.72	.87	51	F 57	28	1.68	.89	53
M 86	27	1.67	.81	48	F 75	9	1.67	.94	56
M 56	28	1.50	.68	45					
M 82	13	1.31	.60	46					
All Boys	747	2.62	1.51	58	All Girls	648	2.03	1.08	53

TABLE IV A (Cont.)

Number of Children Addressed: First Grade Group--Number of Five-Minute Observation Periods in which Speech Was Addressed to Children, Mean Number of Different Children Addressed per Period, Standard Deviation and Coefficient of Variation.

Boys	Number of Periods	Mean	σ	V	Girls	Number of Periods	Mean	σ	V
M 101	24	4.46	2.12	48	F 98	23	4.35	1.49	34
M 105	24	4.38	1.71	39	F 122	22	3.36	1.27	38
M 108	24	3.62	1.62	45	F 92	23	3.35	1.49	44
M 106	23	3.48	1.84	53	F 124	19	3.32	1.48	45
M 107	23	3.26	1.54	47	F 96	24	3.25	1.69	52
M 147	24	3.04	1.34	44	F 93	22	3.09	1.65	53
M 104	24	3.04	1.31	43	F 110	22	3.04	1.27	42
M 140	24	2.96	1.01	34	F 95	23	2.91	1.51	52
M 149	21	2.95	1.22	41	F 113	24	2.83	1.38	49
M 142	24	2.62	1.48	56	F 111	20	2.65	1.59	60
M 103	24	2.54	1.29	51	F 97	23	2.56	1.22	48
M 120	24	2.29	1.17	51	F 129	23	2.43	1.75	72
M 119	24	2.25	.97	43	F 94	19	2.32	1.55	67
M 121	22	1.82	.77	42	F 112	21	2.09	1.12	54
					F 89	23	2.00	.98	49
All Boys	329	3.06	1.60	52	All Girls	331	2.91	1.56	54

TABLE V A

Speech to Adults: Nursery School Group—Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 19	127	5.29	6.35	120	F 14	64	2.67	2.39	90
M 6	102	4.25	8.82	208	F 5	63	2.62	4.03	153
M 10	97	4.04	5.47	135	F 6	60	2.50	3.25	130
M 20	78	3.25	3.86	119	F 8	58	2.42	3.67	152
M 12	68	2.83	2.56	90	F 16	52	2.17	3.98	183
M 5	65	2.71	3.42	126	F 9	51	2.12	3.37	159
M 16	53	2.21	4.13	187	F 7	45	1.87	3.54	189
M 3	52	2.17	3.20	148	F 18	44	1.83	2.84	155
M 4	52	2.17	3.70	171	F 19	33	1.37	1.81	132
M 17	41	1.71	3.71	217	F 1	28	1.17	1.79	154
M 8	41	1.71	2.05	120	F 2	24	1.00	1.68	168
M 2	40	1.67	1.65	99	F 4	23	.96	1.79	187
M 9	25	1.04	1.79	172	F 10	23	.96	2.23	232
M 13	23	.96	2.49	260	F 3	17	.71	1.27	180
M 1	21	.87	1.18	135	F 12	13	.54	1.32	245
M 14	20	.83	1.49	179	F 17	11	.46	.91	199
M 7	14	.58	1.66	284	F 13	6	.25	.72	288
M 11	12	.50	.96	192					
M 15	2	.08	.37	451					
All Younger Boys	933	2.05	3.94	192	All Younger Girls	615	1.51	2.73	181
M 18	121	5.04	4.88	97	F 20	149	6.21	6.10	98
M 14	114	4.75	5.09	107	F 11	86	3.58	4.68	131
M 13	103	4.29	4.74	110	F 17	85	3.54	5.87	166
M 20	76	3.17	3.36	106	F 19	71	2.96	3.51	119
M 17	69	2.87	3.53	123	F 13	70	2.92	3.20	110
M 21	69	2.87	4.72	164	F 14	66	2.75	2.55	93
M 19	63	2.62	2.41	92	F 16	64	2.67	2.51	94
M 15	40	1.67	2.15	129	F 18	57	2.37	4.16	175
M 16	32	1.33	1.82	136	F 12	48	2.00	1.96	98
					F 10	29	1.21	1.58	131
					F 15	27	1.12	1.76	157
All Older Boys	687	3.18	4.04	127	All Older Girls	752	2.85	3.95	139

TABLE V A (Cont.)

Speech to Adults: Kindergarten Group—Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 41	132	4.12	4.34	105	F 60	183	5.72	5.32	93
M 54	106	3.31	4.79	145	F 48	135	4.22	3.50	83
M 61	97	3.03	4.20	139	F 50	130	4.06	4.87	120
M 38	70	2.19	3.84	175	F 59	103	3.22	4.19	130
M 89	58	1.81	2.16	119	F 52	101	3.16	3.94	125
M 64	56	1.75	3.04	174	F 62	87	2.72	3.25	119
M 65	54	1.69	2.36	140	F 58	80	2.50	3.88	155
M 47	53	1.66	2.53	152	F 38	69	2.16	3.86	179
M 40	50	1.56	2.69	172	F 51	57	1.78	2.50	140
M 35	49	1.53	1.58	103	F 40	45	1.41	1.86	132
M 60	44	1.37	2.26	164	F 43	45	1.41	2.35	167
M 63	38	1.19	2.61	219	F 57	43	1.34	2.34	175
M 66	33	1.03	2.13	207	F 83	42	1.31	2.48	189
M 55	31	.97	3.08	318	F 54	34	1.06	1.73	163
M 58	26	.81	1.43	177	F 42	32	1.00	1.94	194
M 59	25	.78	1.11	142	F 78	30	.94	2.07	220
M 48	19	.59	1.11	188	F 56	28	.87	1.86	211
M 93	16	.50	1.20	240	F 71	27	.84	1.81	215
M 82	16	.50	1.48	296	F 37	16	.50	1.06	212
M 39	9	.28	.57	204	F 39	15	.47	1.30	277
M 56	9	.28	.57	204	F 77	12	.37	.78	205
M 36	8	.25	.94	376	F 75	10	.31	.77	248
M 86	4	.12	.55	458	F 47	8	.25	.66	264
M 80	3	.09	.52	578	F 35	5	.16	.62	388
M 84	3	.09	.38	422					
M 43	2	.06	.24	400					
All Boys	1011	1.22	2.53	207	All Girls	1337	1.74	3.17	182

TABLE V A (Cont.)

Speech to Adults: First Grade Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 142	85	3.54	4.45	125	F 129	66	2.75	3.91	138
M 149	46	1.92	2.46	128	F 92	43	1.79	3.10	173
M 121	44	1.83	3.11	170	F 124	31	1.29	2.11	164
M 140	34	1.42	2.94	207	F 113	19	.79	1.04	132
M 147	21	.87	1.42	161	F 94	15	.62	1.15	186
M 105	18	.75	1.36	182	F 93	14	.58	1.15	199
M 120	15	.62	1.29	208	F 98	14	.58	.86	149
M 103	11	.46	1.12	243	F 122	13	.54	1.19	220
M 104	10	.42	.95	227	F 111	13	.54	.87	160
M 119	10	.42	.91	216	F 112	9	.37	1.07	282
M 108	7	.29	.79	272	F 95	5	.21	.70	336
M 101	6	.25	.60	238	F 110	4	.17	.37	212
M 106	5	.21	.58	274	F 89	3	.12	.60	500
M 107	2	.08	.40	500	F 97	1	.04	.20	500
					F 96	0	0	0	0
All Boys	314	.93	2.18	234	All Girls	250	.69	1.75	254

TABLE VI A

Nonsocial Language: Nursery School Group--Total Number of Five-Second Intervals in 24 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 5	414	17.25	10.25	59	F 9	425	17.71	15.43	87
M 8	350	14.58	7.22	60	F 1	366	15.25	9.30	61
M 2	265	11.04	7.77	70	F 8	315	13.13	6.97	53
M 10	263	10.96	8.31	76	F 3	234	9.75	5.61	58
M 6	251	10.46	11.04	106	F 6	172	7.17	4.33	60
M 3	238	9.92	6.75	68	F 12	169	7.04	7.41	105
M 1	224	9.33	7.15	77	F 10	148	6.17	3.81	62
M 4	173	7.21	5.86	81	F 17	135	5.63	5.68	101
M 19	170	7.08	5.36	76	F 2	126	5.25	4.76	91
M 16	159	6.63	11.20	169	F 19	112	4.67	6.73	144
M 9	124	5.17	5.19	100	F 16	110	4.58	5.41	118
M 17	121	5.04	6.72	133	F 13	91	3.79	8.32	220
M 11	105	4.38	5.20	119	F 7	74	3.08	3.33	108
M 14	100	4.17	4.58	110	F 5	73	3.04	3.88	128
M 13	81	3.37	5.46	162	F 18	72	3.00	6.20	207
M 7	68	2.83	4.54	160	F 4	36	1.50	3.98	265
M 12	67	2.79	3.67	132	F 14	26	1.08	1.68	156
M 20	56	2.33	3.28	141					
M 15	23	.96	1.90	198					
All Younger Boys	3252	7.13	8.09	113	All Younger Girls	2684	6.58	8.20	125
M 16	240	10.00	10.18	102	F 10	175	7.29	7.70	106
M 19	226	9.42	8.48	90	F 18	162	6.75	9.00	133
M 15	184	7.67	7.90	103	F 12	142	5.92	5.72	97
M 17	138	5.75	7.18	125	F 19	142	5.92	7.21	122
M 21	137	5.71	6.78	119	F 15	133	5.54	6.84	123
M 14	134	5.58	6.33	113	F 13	116	4.83	7.15	148
M 18	131	5.46	5.26	96	F 16	100	4.17	5.19	124
M 20	92	3.83	3.84	100	F 14	98	4.08	4.19	103
M 13	66	2.75	3.66	133	F 17	78	3.25	3.10	95
					F 20	74	3.08	3.29	107
					F 11	48	2.00	4.35	218
All Older Boys	1348	6.24	7.28	117	All Older Girls	1268	4.80	6.28	131

TABLE VI A (Cont.)

Nonsocial Language: Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 54	347	10.84	13.41	124	F 59	322	10.06	15.31	152
M 80	206	6.44	5.99	93	F 54	106	3.31	5.13	152
M 66	160	5.00	10.93	219	F 52	101	3.16	6.07	192
M 63	148	4.62	9.07	196	F 38	97	3.03	3.40	112
M 59	128	4.00	6.37	159	F 40	90	2.81	3.96	141
M 47	127	3.97	4.42	111	F 57	84	2.62	3.85	147
M 65	127	3.97	7.65	193	F 71	79	2.47	6.30	255
M 61	108	3.37	5.55	164	F 62	64	2.00	3.11	156
M 84	93	2.91	3.41	117	F 77	57	1.78	2.90	163
M 86	92	2.87	5.95	207	F 42	53	1.66	4.16	251
M 35	92	2.87	3.60	125	F 60	47	1.47	2.45	167
M 43	89	2.78	6.07	218	F 35	46	1.44	2.90	201
M 64	84	2.62	5.74	219	F 78	39	1.22	2.75	225
M 60	72	2.25	3.17	141	F 56	39	1.22	2.09	171
M 58	63	1.97	6.50	330	F 39	29	.91	1.76	193
M 48	61	1.91	2.30	120	F 37	28	.87	1.24	141
M 55	48	1.50	3.14	209	F 48	26	.81	2.78	343
M 40	47	1.47	3.99	271	F 83	23	.72	1.26	175
M 36	39	1.22	1.41	116	F 51	19	.59	1.11	188
M 41	28	.87	1.41	160	F 47	18	.56	.93	166
M 39	24	.75	1.22	163	F 58	15	.47	.99	211
M 93	23	.72	1.68	233	F 43	13	.41	.93	227
M 38	18	.56	2.62	468	F 50	11	.34	.64	188
M 82	11	.34	1.16	341	F 75	1	.03	.17	567
M 89	11	.34	.77	226					
M 56	5	.16	.71	437					
All Boys	2251	2.77	5.96	215	All Girls	1407	1.83	4.71	257

TABLE VII A

Work Activity: Kindergarten Group—Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 63	1715	53.59	5.36	10	F 51	1644	51.37	9.66	19
M 66	1681	52.53	7.80	15	F 58	1614	50.44	8.42	17
M 56	1681	52.53	9.69	18	F 57	1592	49.75	10.56	21
M 82	1675	52.34	9.80	19	F 60	1590	49.69	11.15	22
M 86	1653	51.66	10.30	20	F 71	1584	49.50	8.66	17
M 84	1608	50.25	10.68	21	F 54	1583	49.47	9.95	20
M 93	1585	49.53	11.30	23	F 62	1570	49.06	10.31	21
M 54	1583	49.47	11.23	23	F 77	1562	48.81	9.64	20
M 60	1577	49.28	10.82	22	F 48	1558	48.69	9.37	19
M 65	1575	49.22	7.81	16	F 50	1534	47.94	7.67	16
M 55	1561	48.78	9.03	19	F 59	1526	47.69	9.10	19
M 48	1560	48.75	12.41	25	F 83	1522	47.56	14.85	31
M 36	1548	48.38	10.92	23	F 78	1507	47.09	8.35	18
M 64	1545	48.28	8.44	17	F 52	1487	46.47	11.18	24
M 89	1526	47.69	10.99	23	F 47	1468	45.87	13.28	29
M 41	1505	47.03	8.62	18	F 37	1450	45.31	9.94	22
M 58	1503	46.97	9.46	20	F 42	1388	43.37	9.44	22
M 59	1501	46.91	11.97	26	F 75	1388	43.37	11.46	26
M 38	1449	45.28	11.91	26	F 56	1382	43.19	12.34	29
M 61	1439	44.97	8.20	18	F 38	1344	42.00	10.04	24
M 43	1370	42.81	11.85	28	F 39	1328	41.50	12.34	30
M 80	1361	42.53	12.61	30	F 43	1310	40.94	10.60	26
M 35	1356	42.38	8.27	20	F 40	1246	38.94	12.16	31
M 47	1282	40.06	12.36	28	F 35	976	30.50	11.24	37
M 40	1254	39.19	13.72	35					
M 39	1173	36.66	14.56	40					
All Boys	39266	47.19	11.58	25	All Girls	35153	45.77	11.59	25

TABLE VIII A

Use of Work Materials: Kindergarten Group--Total Number of Five-Second Intervals in 32 Five-Minute Observations, Mean Number of Intervals per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 82	1272	39.75	12.17	31	F 51	1237	38.66	10.73	28
M 36	1268	39.62	11.22	28	F 71	1226	38.31	7.00	18
M 56	1263	39.47	8.67	22	F 37	1190	37.19	12.81	34
M 84	1241	38.78	11.88	31	F 42	1167	36.47	9.86	27
M 48	1225	38.28	12.33	32	F 58	1148	35.87	8.98	25
M 63	1171	36.59	9.96	27	F 39	1139	35.59	11.76	33
M 41	1167	36.47	9.92	27	F 77	1101	34.41	9.80	28
M 35	1118	34.94	12.48	36	F 54	1097	34.28	10.61	31
M 89	1118	34.94	13.62	39	F 47	1090	34.06	13.41	39
M 66	1101	34.41	9.38	27	F 57	1088	34.00	9.91	29
M 86	1099	34.34	13.17	38	F 62	1085	33.91	10.25	30
M 38	1043	32.59	11.99	37	F 78	1078	33.69	11.67	35
M 60	1040	32.50	10.01	31	F 38	1076	33.62	10.31	31
M 65	1022	31.94	11.32	35	F 59	1066	33.31	11.68	35
M 93	1004	31.37	10.94	35	F 40	1064	33.25	11.59	35
M 54	994	31.06	11.38	37	F 48	1063	33.22	10.90	33
M 64	960	30.00	8.24	27	F 75	1053	32.91	9.74	30
M 58	958	29.94	9.84	33	F 52	1046	32.69	10.47	33
M 59	950	29.69	12.16	41	F 60	1024	32.00	11.98	37
M 40	939	29.34	14.75	50	F 43	1010	31.56	10.33	33
M 55	904	28.25	10.18	36	F 50	1002	31.31	10.62	34
M 61	882	27.56	9.78	35	F 83	963	30.09	14.95	50
M 80	855	26.72	12.79	48	F 56	928	29.00	12.69	44
M 47	831	25.97	10.71	41	F 35	788	24.62	9.58	39
M 39	826	25.81	15.15	59					
M 43	809	25.28	10.40	41					
All Boys	27060	32.52	12.31	38	All Girls	25729	33.50	11.45	34

TABLE IX A

Number of Distractions from Work: Kindergarten Group--Total Number of Instances of Continuous Non-Job Activity in 32 Five-Minute Observations, Mean Number per Observation, Standard Deviation and Coefficient of Variation.

Boys	Total	Mean	σ	V	Girls	Total	Mean	σ	V
M 80	313	9.78	3.65	37	F 35	344	10.75	4.67	43
M 39	302	9.44	4.73	50	F 38	285	8.91	3.80	43
M 61	276	8.62	5.18	60	F 42	279	8.72	3.95	45
M 40	268	8.37	3.91	47	F 37	262	8.19	3.28	40
M 64	233	7.28	3.54	49	F 43	260	8.12	3.49	43
M 47	219	6.84	2.43	36	F 40	256	8.00	3.41	43
M 58	218	6.81	3.04	45	F 78	252	7.87	3.64	46
M 84	215	6.72	3.40	51	F 47	240	7.50	3.74	50
M 43	207	6.47	3.57	55	F 39	236	7.37	2.91	39
M 35	206	6.44	3.65	57	F 56	234	7.31	2.82	39
M 36	205	6.41	3.89	61	F 75	220	6.87	3.54	52
M 59	202	6.31	4.35	69	F 59	214	6.69	3.72	56
M 60	201	6.28	3.84	61	F 52	208	6.50	3.00	46
M 65	201	6.28	2.96	47	F 77	207	6.47	3.99	62
M 56	200	6.25	4.51	72	F 83	202	6.31	5.31	84
M 89	200	6.25	3.71	59	F 62	202	6.31	2.90	46
M 41	200	6.25	3.02	48	F 58	201	6.28	3.28	52
M 86	193	6.03	3.46	57	F 60	194	6.06	4.14	68
M 38	183	5.72	3.65	64	F 71	192	6.00	3.34	56
M 55	179	5.59	3.18	57	F 51	189	5.91	3.68	62
M 63	178	5.56	4.04	73	F 57	186	5.81	4.12	71
M 93	169	5.28	3.68	70	F 50	184	5.75	2.95	51
M 48	167	5.22	3.29	63	F 48	177	5.53	3.56	64
M 54	158	4.94	3.55	72	F 54	147	4.59	2.83	62
M 66	153	4.78	3.22	67					
M 82	140	4.37	3.78	86					
All Boys	5386	6.47	3.85	59	All Girls	5371	6.99	3.90	56

APPENDIX D

TABLE XII .

Chi-Square Test of the Independence of Sub-Samples for Category "Speech to Children."

Child	(1) f	(2) $f\frac{N'}{1000}$	(3) f'	(4) $f'\frac{N}{1000}$	(5) $f\frac{N'}{1000} - f'\frac{N}{1000}$	(6) $(f\frac{N'}{1000} - f'\frac{N}{1000})^2$	(7) f+f'	$\frac{(6)}{(7)}$
F 51	70	132.020	90	169.380	- 37.4	1399	160	8.74
F 50	40	75.440	88	165.616	- 90.2	8136	128	63.56
F 52	111	209.346	67	126.094	83.3	6939	178	38.98
F 71	66	124.476	51	95.982	28.5	812	117	6.94
F 54	137	258.382	99	186.318	72.1	5198	236	22.03
F 47	113	213.118	111	208.902	4.2	18	224	.08
F 56	58	109.388	116	218.312	-108.9	11859	174	68.16
F 57	104	196.144	85	159.970	36.2	1310	189	6.93
F 58	33	62.258	17	31.994	30.2	912	50	1.82
F 48	49	92.414	57	107.274	- 14.9	222	106	2.19
F 59	56	105.616	43	80.926	24.7	610	99	6.16
F 75	7	13.202	4	7.528	5.7	32	11	2.91
F 55	74	139.564	65	122.330	17.2	296	139	2.13
F 77	173	326.278	153	287.946	38.3	1467	326	4.50
F 78	15	28.290	99	186.318	-158.0	24964	114	218.98
F 37	113	213.118	91	171.262	41.9	1756	204	8.61
F 38	132	248.952	196	368.872	-119.9	14376	328	43.85
F 40	75	141.450	72	135.504	5.9	35	147	.24
F 39	75	137.678	40	75.280	62.4	3894	115	34.46
F 60	32	60.352	57	107.274	- 46.9	2200	89	24.72
F 42	51	96.186	45	84.690	11.5	132	96	1.38
F 43	82	154.652	55	103.510	51.1	2611	137	19.06
F 85	179	337.594	147	276.654	60.9	3709	326	11.38
F 62	39	73.554	38	71.516	2.0	4	77	.05
N = 1882		N' = 1886					3768	597.84

$NN' = 3,549,452$

$\frac{1,000,000}{NN'} = \frac{1}{3.55}$

f = Total Intervals of Speech to Children in Sample I

f' = Total Intervals of Speech to Children in Sample II

$\chi^2 = \frac{1}{3.55} \times 597.84 = 168.41$

χ^2 when n = 23, P = .50, = 22.34

$\frac{168.41}{22.34} = 7.5$

$\sqrt{7.5} = 2.7$

NOTE: f and f' correspond, respectively, to a and a' in Fisher's formula.

TABLE XIII

Test of Means of Sub-Samples for Category "Speech to Children": Agreement of Observed with Expected Variation.

Child	(1) Sample I	(2) Mean Sample II	(3) Difference between σs	(4) (Differences)^2	(5) $\frac{\sigma^2}{4}$	$\frac{(4)}{(5)}$
F 51	8.75	11.25	2.50	6.25	19.25	0.3
F 50	5.00	11.00	6.00	36.00	14.26	2.5
F 52	13.88	8.38	5.50	30.25	29.75	1.0
F 71	8.25	6.38	1.87	3.50	14.65	0.2
F 54	17.12	12.38	4.74	22.47	36.26	0.6
F 47	14.12	13.88	.24	.06	27.12	0.0
F 56	7.25	14.50	7.25	52.56	23.85	2.2
F 57	13.00	10.62	2.38	5.66	29.19	0.2
F 58	4.12	2.12	2.00	4.00	5.09	0.8
F 48	6.12	7.12	1.00	1.00	7.84	0.1
F 59	7.00	5.38	1.62	2.62	13.03	0.2
F 75	.88	.50	.38	.14	7.26	0.0
F 35	9.25	8.12	1.13	1.28	18.23	0.1
F 77	21.62	19.12	2.50	6.25	27.81	0.2
F 78	1.88	12.38	10.50	110.25	13.86	8.0
F 37	14.12	11.38	2.74	7.51	27.15	0.3
F 38	16.50	24.50	8.00	64.00	23.72	2.7
F 40	9.38	9.00	.38	.14	16.12	0.0
F 39	9.12	5.00	4.12	16.97	12.44	1.4
F 60	4.00	7.12	3.12	9.73	9.63	1.0
F 42	6.38	5.62	.76	.58	7.12	0.1
F 43	10.25	6.88	3.37	11.36	10.01	1.1
F 83	22.38	18.38	4.00	16.00	41.04	0.4
F 62	4.88	4.75	.13	.02	5.66	0.0

$\frac{24}{23.4}$
= 1.0

TABLE XIV

Test of Standard Deviations of Sub-Samples for Category "Speech to Children": Agreement of Observed with Expected Variation.

Child	(1) σ Sample I	(2) σ Sample II	(3) Difference between σs	(4) (Differences)²	(5) $\frac{\sigma^2}{8}$	$\frac{(4)}{(5)}$
F 51	10.13	6.78	3.35	11.22	9.62	1.2
F 50	5.37	11.27	5.90	34.81	8.81	4.0
F 52	11.20	11.42	.22	.05	14.88	0.0
F 71	10.09	9.25	.84	.71	7.33	0.1
F 54	9.14	14.91	5.77	33.29	18.13	1.8
F 47	8.88	9.15	.27	.07	13.57	0.0
F 56	5.21	14.20	8.99	80.82	11.93	6.8
F 57	11.77	6.96	4.81	23.14	14.59	1.6
F 58	4.85	3.30	1.55	2.40	2.54	0.9
F 48	5.42	4.50	.92	.85	3.92	0.2
F 59	7.40	4.89	2.51	6.30	6.52	1.0
F 75	1.24	1.07	.17	.03	3.63	0.0
F 35	6.25	8.21	1.96	3.84	9.12	0.4
F 77	11.42	12.29	.87	.76	13.90	0.1
F 78	1.54	9.01	7.47	55.80	6.93	8.1
F 37	12.91	12.10	.81	.66	13.57	0.1
F 38	10.42	7.91	2.51	6.30	11.99	0.5
F 40	8.65	6.89	1.76	3.10	8.06	0.4
F 39	9.54	4.07	5.47	29.92	6.17	4.8
F 60	4.40	7.81	3.41	11.63	4.82	2.4
F 42	5.57	5.16	.41	.17	3.56	0.0
F 43	5.57	5.14	.43	.18	5.01	0.0
F 83	14.00	16.11	2.11	4.45	20.52	0.2
F 62	3.55	6.04	2.49	6.20	2.83	2.2

$\sqrt{\frac{36.8}{24}}$
= 1.5

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